DOCUMENT RESUME

ED 294 955 UD 026 183

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TITLE The Role of Testing and Evaluation.
INSTITUTION California Univ., Los Angeles. Center for the Study of Evaluation.
SPONS AGENCY Office of Educational Research and Improvement (ED), Washington, DC.
PUB DATE Nov 87
GRANT OERI-G-86-90003
NOTE 104p.; In: Making Schools Work for Underachieving Minority Students: Next Steps for Research, Policy, and Practice. Proceedings of the Conference, see UD 026 176.
PUB TYPE Speeches/Conference Papers (150)

EDRS PRICE MF01/PC05 Plus Postage.
DESCRIPTORS Academic Achievement; Achievement Tests; Computer Assisted Testing; Data Collection; *Educational Improvement; *Educational Testing; Elementary Secondary Education; Equal Education; Limited English Speaking; Lower Class Students; Minimum Competency Testing; *Minority Group Children; *Program Evaluation; Research Utilization; School Effectiveness; Social Attitudes; Teacher Education; Test Construction; Test Interpretation; Underachievement; Urban Education
IDENTIFIERS Fairfax County Schools VA; Portland School District OR

ABSTRACT

A group of seven conference papers, all dealing with the role of testing and evaluation in the schools, is presented in this document. The papers are as follows: (1) "Framework for Effective Schools" (Eric Cooper), which identifies indicators of efficacy, quality, and equity; (2) "Quality Indicators for Monitoring Equity" (Ramsay Selden), which calls for a reform of data collection on how schools are functioning for underachieving minorities; (3) "Persistence and Patience" (Todd Endo), which discusses the development and evaluation of the Fairfax County (Virginia) Public Schools' minority students' achievement plan; (4) "Monitoring and Improving School Learning" (Walter Hathaway), which discusses improvements in achievement testing and test results made by the Portland, Oregon, school district; (5) "The Need to Assess Multiple Crucial Components in Evaluating Programs" (Daniel Levine), which illustrates the importance of attending to multiple components of effective programs and determining how they may improve instruction for disadvantaged minority students; (6) "Some Thoughts on How Testing and Evaluation Can Improve Educational Opportunities for Underachieving Minorities" (Ernesto M. Bernal), which suggests that evaluation and testing can improve programs for underachieving minority students by documenting progress; and (7) "Results from Using the WICAT Learning Solution for Underachieving Minority Students" (James B. Olsen). Some of the papers contain data tables and figures, and/or include lists of references. (BJV)

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THE ROLE OF TESTING AND EVALUATION

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THE ROLE OF TESTING AND EVALUATION

Framework for Effective Schools[1]

Eric Cooper
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The strength of our nation is a direct function of the ability of our schools to educate -- majority as well as minority, women as well as men, children as well as adults. All students served -- all students educated. This is not only a goal, but a necessity. An institution that provides "effective schooling" is one that is able to maintain sustained progress towards national goals and expectations for all students.

In this definition, it is important to note that a school with a "good" reputation may not be an effective school. The difference between the two relates to the concept of progress and whether or not all students are well served. To some, "good schools" develop high levels of achievement for a certain portion of the students served. Effective schools, on the other hand, hold to a higher standard. They sustain high levels of growth for all students.

The recent reports on reading and writing produced by the National Assessment of Educational Progress document well the fact that the average performance of students on the process outcomes of education is simply not high enough to meet the needs of the Nation. The Nation is still at risk. Therefore, for effective schooling to become a reality, our schools must set and hold all students to higher expectations of performance on the process outcomes of education.

In order to provide effective schooling, an institution must set high goals and expectations, not only for the students served, but also for its administrators and its teachers and parents. And these goals and expectations must apply equally to students who are considered academically gifted and those who are considered educationally at risk. While equality in outcomes cannot be guaranteed, there is no place for differential opportunities or expectations for students.

[1]This framework was developed by the Ad Hoc Committee on Effective Schools

Stating that an institution has high expectations for the students it serves is not enough for effective schooling. These expectations must be stated in concrete terms -- in ways that can be observed and assessed. And as an integral part of effective schooling, student progress towards these expectations must be monitored continuously -- by measures of valued educational outcomes as well as by other indicators of success. An example of the former would be the periodic assessment of student ability to write through the use of direct writing samples. An example of the latter would be evidence that the retention rate for at-risk students was as high as the retention rate for the academically talented.

In stating that measures of valued educational outcomes must be used to monitor student progress, it is important to define what is meant by "valued educational outcomes." Education is not simply the acquisition of subject matter knowledge -- the facts and figures. Effective schooling involves the processes of learning -- the processes needed to actually solve problems, read with comprehension, and develop an idea in writing, for example. And measures of these processes, rather than of the discrete skills and facts, must be used to assess student progress towards these valued outcomes. No school can be considered effective without evidence of sustained progress for all students on these processes of learning.

In order to ensure that instruction is fulfilling student needs, appropriate tests that are in accord with real-world outcomes should be used. These tests should repeatedly show that students in all classrooms and at ali ability levels are making satisfactory progress toward stated goals and expectations. They should demonstrate that students are successful on those optimally difficult learning tasks that ensure growth.

While it is important for teachers to use tests to monitor instruction, it is very important to distinguish these tests from those which show that students are making progress toward valued educational outcomes. These outcome measures should be used for the purpose of redesigning the curriculum and teacher-directed

instruction so that ever increasing progress is made towards the bottom line -- towards attaining valued outcomes.

Two statewide testing programs stand out as exemplars in terms of their use of measures that focus on the process outcomes of education rather than the discrete skills and facts of education. In Connecticut and New York, outcome measures are used that permit the assessment of student progress towards expectations -- absolute expectations set in terms of functional needs of the State and the Nation rather than relative needs set in relation to the average performance of students on tests that are only norm-referenced.

Effective schools use a variety of assessments to provide information for informed decision-making not only in terms of current problems, but also with respect to the need for attaining those levels of performance required to function effectively in the future. According to NAEP, for example, only 1 in 20 seventeen-year-old students can read at the "adept" level. It is obvious that we need to know what must be done in the future in order to plan for new and higher levels of performance.

Inadequate student performance is a cause for restructuring and redesign not only of educational programs, but also of the retooling of management and related support systems in the school and in the community which are required for implementation of instructional programs that have been shown to work in similar educational systems. Effective schools are problem-solving institutions which serve all students in meeting their aspirations and the nation's need for informed, literate citizens in an increasingly competitive world.

In order to define and resolve problems, and sustain high levels of progress for all students, effective schools:

- Reallocate and/or allocate additional resources (e.g., time, teachers, and materials) to improve the performance of low-achieving students.

- Involve teachers and other staff in ongoing examination and revision of decisions and in collegial problem-solving regarding effective implementation of instruction within and across classrooms.

- Provide adequate resources to improve the delivery of instruction of the most important learning skills, particularly for low-achieving students, through school-wide staff development.

In drawing attention to the processes of learning, such as the ability to solve problems, read with comprehension, and develop an idea in writing, we must take note of the fact that effective schooling requires that students be engaged in productive learning experiences, not simply time-on-task. And throughout the school year, the amount of time students are actively engaged in the learning process is critically important. Furthermore, teachers must be sensitive to the needs and abilities of the students served in order to engage them in productive learning experiences in the classroom. This means that the materials used to deliver instruction must not be so easy as to create boredom, nor too difficult to create frustration.

In effective schools, all students must have a demonstrable opportunity to develop cognitive processes to comprehend, think, and compute. This means that students should be actively engaged in a mixture of interactive and teacher-directed instruction for a significant portion of the school day. All students should also have an opportunity to learn in the content fields and such opportunities should be integrated with the development of processing capabilities. While the curriculum may be enriched for the gifted, it should not be trivialized for those who are at risk or who are more dependent upon the school for their development. Finally, effective schooling requires that teachers be sensitive to the art of classroom questioning, listening well to student responses and providing constructive clues and feedback to facilitate the learning process.

While the above generalities hold for institutions that provide effective schooling, there are a number of additional requirements for institutions that serve high-risk students -- students, who are almost solely dependent upon schools for the development of the processes of education. The educational attainments of disadvantaged students, who are disproportionately black, Hispanic, American Indian, and poor serve as a barometer to determine whether a school is engaged in effective schooling. An effective school produces as much progress towards national goals and expectations for these students as it does for the educationally advantaged.

To provide effective schooling for the educationally disadvantaged, a school must assign some of the best teachers, allocate a disproportionate amount of resources, and provide small class sizes or otherwise address the problems of these students. Anything less, and the educationally disadvantaged will not be able to sustain progress towards the acquisition of the processes of learning. Finally, to sustain progress, particularly for at-risk students, attendance should be high and the school should aggressively resist the transferring of students in and out of classrooms for pull-out programs, unless they are fully and productively coordinated with regular classroom instruction.

Effective schooling requires that concrete and manageable plans be developed and in place for starting off a school year with complete programs and a fully professional staff ready to teach. The school year is too short to waste time on start-up processes and it is especially important to make sure that the at-risk students are served with the best staff from the very start of the school year. Effective schooling requires the systemtic upgrading of instruction so that it is in accord with the state-of-the-art in instructional fields as documented in various professional reports such as the NIE report entitled, Becoming A Nation of Readers.

Teachers and administrators who provide effective schooling are critical consumers of educational books, computer software, and other products, making sure that they have been validated for instructional use. Because these products overwhelmingly determine the nature of instruction, those involved in effective schooling frequently acquire updated products to support efforts at upgrading themselves.

Effective schools recognize the importance of teachers, parents, and community representatives and involve them in the planning, decision-making, and evaluation process of educating children. Effective schools do not depend on top-down mandates to improve instruction. Effective implementation of instructional reform requires a mixture of school-level decision-making and top-level direction-setting, with emphasis on on-going, building-level staff development and initiative focusing on how instructional improvements will be defined, implemented, and modified. Teachers must be deeply involved as scholar practitioners in determining, through collegial decision making, how improvements are shaped and delivered.

Evaluation indicators and criteria that can be employed in identifying institutions that provide effective schooling can be grouped under three major headings: (1) indicators of efficacy, (2) indicators of quality, and (3) indicators of equality. Examples of such criteria are as follows:

(1) Indicators of efficacy:

- Assessment of educational outcomes based on process measures such as work samples, direct writing samples, and holistic measures of comprehension. Specifically, tests which sample discrete skills rather than engage comprehension, writing, and computing processes should not be relied upon as indicators of educational progress. Attempts to legislate improvements in education through minimum competency testing programs fall short for students, especially students who are at risk, because they focus attention on lower-level discrete skills at the expense of comprehension, problem-solving, and the expression of ideas orally and in writing.

- Frequent monitoring of student progress towards outcomes by classroom teachers using a variety of formal and informal procedures.

(2) Indicators of quality:

- A supportive school climate which is also visible in the classroom.

- Clear statements of school goals and expectations which are shared by students, school staff, parents, and other community representatives.

- Other components of effective schools as indentified in the literature, e.g., 1) school mission; 2) leadership; 3) school climate; 4) high expectations; 5) instructional improvement; 6) assessment.

(3) Indicators of equality:

- Attendance rates for at-risk students which equal or exceed those for the entire school.

- Retention and completion rates for at-risk students which equal or exceed that for the entire school.

- Progress toward educational goals and expectation for at-risk students which is equal to that made by all students.

To employ such indicators in the identification of effective schools, it is important to remember that such data must be available on a disaggregated basis. Effective schools must collect, record, and retain quantitative and qualitative data in a fashion that supports longitudinal analysis of the performance of individual students and groups of students. Such analyses would include, for example, data disaggregated by race, ethnicity, gender, socioeconomic status, and grade level. Anything less and there is no way to ascertain whether sustained progress is being made for all students.

Schools that provide effective schooling are humane and creative problem-solving institutions that engage students in academic learning processes which enable them to become capable of full participation in a free society that needs intellectually capable citizens.

THE ROLE OF TESTING AND EVALUATION

Quality Indicators for Monitoring Equity

Ramsay Selden
Council of Chief State School Officers

I am the director of the effort by the Council of Chief State School Officers to develop better indicators for education. The part of that job that is politically popular right now and the one that generates interest in the press is the issue of state by state comparisons and comparative achievement testing. It is, however, a small part of what I believe to be the very important problem of developing better indicators for monitoring educational equity. We should have better indicators, but we don't, because it is not the primary task that is before a group of educators like this one. Your primary task is making schools work for underachieving students. I think, however, that the development of educational indicators is a supportive task that can make your efforts work better and be more successful. I am in the business I'm in because I believe in indicators and their value.

We need better information on how schools are functioning for underachieving minorities. I would like to explain how that would work, in a sort of idealistic sense, and then tell you, from state policymaker's perspective, where we stand in terms of getting the information we need.

This model of the distribution of excellence in the school system was developed by Jeannie Oakes of the Rand Corporation. I liked it before this meeting, but now I like it even more, because it pulls together many of the things that have been discussed during this conference. According to this model, there is a process that results in inequitable outcomes in the school systems in this country.

This process begins at the elementary school level, where the extent of a child's interest and achievement leads to placement in one of two routes at the junior high level. If the elementary school child has an opportunity to develop interests and he demonstrates achievement, that child is much more likely, according to the research, to be placed in high school academic prep programs, or even initial high school courses at the junior high level.

That placement leads to the high school college prep program, which is characterized by more academic courses, courses that are sequential in nature, courses that accumulate and build on one another, and courses that present advanced-level content. The advanced courses stimulate additional interest and persistence in studying academic subject matter beyond minimum requirements.

Down the other route, the elementary child who does not experience success in academic achievement early in elementary school loses interest, and tends to be placed in intermediate or junior high school programs that are remedial in content and practical in orientation. That placement leads them to high school programs that are vocational, general, or remedial, and that are characterized by fewer academic courses. Generally, courses that don't build upon one another and that address lower level content are not sequential. These courses promote a lack of interest, persistence, and further achievement on the part of the students enrolled in them. These students are much less likely to overcome that experience and be interested in going on to the high school or higher education levels.

Although these two paths are very logical and feel intuitive, the model was constructed by synthesizing research. The snowball effect described above is what really happens in schools. This is how kids get tracked down one route or the other. I think one of the most troubling aspects of this problem is the clear recognition that the process starts early, at the elementary school level.

Based on her model, Oakes developed a set of indicators to show the extent to which schools are engendering that routing and those patterns of success for minority students and for women. The distribution of excellence for minority students and for women were both considered during the development of the indicators.

Basically, the model includes two types of indicators, indicators that measure outcome or performance, and those that measure the processes within schools that characterize how schools are serving different kinds of students.

The outcome or performance indicators, which are evaluated over time, incorporate achievement data by SES, race, and gender. The data need to be coded this way in order for overall patterns of achievement to be analyzed and monitored. The important thing is

that the data be broken down into all three categorical groups at the same time, not just by race without accounting for gender or SES. There are various differential inequity effects within racial groups when they are considered by gender and by SES.

There are a variety of possible outcomes, for example, what students study and learn (achievement in basic skills or subject areas), the courses they complete, and their interests in and their rate of high school completion. These outcomes can be monitored comparatively and over time in order to determine how equitable services in the school are. All aspects of the outcome indicators should be recorded by SES, race, and gender, so that cross-tabulation by groups can be shown. Means within groups should be looked at, and because the comparison of means tends to mask the fact that there is a great deal of variation within groups, the distributions across groups also should be considered.

The process indicators were developed to show if schools are delivering their services equitably. Looking at both the indicators of school and instructional process, then, gives educators a picture of how effectively and equitably programs are working, and signals areas in need of strengthening. For instance, a first step might be to monitor achievement in grades four, eight and eleven by means, and by group, and by the distribution of groups across quartiles. This gives a sense of the extent to which students in racial and ethnic groups are being distributed across the performance range. The data need to be broken down by SES, race, and gender, and cross-tabulated. The school might also keep track of the development of student interests, student confidence, and parental encouragement at each of the grade levels. As group differences in the variables emerge, the schools can then detect those differences and respond to them. Attitudes also should be monitored, especially those related to further study in the academic areas. That monitoring, in this example, would begin in the fourth grade and be repeated in the eighth and tenth grades.

At the elementary level, attention to process might mean keeping track of the instructional time spent in various subjects, again by SES and racial makeup of the school, and amount of homework. We should look at participation by race and SES in high school courses, and the ratio of course enrollments to the proportion of groups in the school population. How disproportionate is student representation in courses like calculus or academic chemistry?

Next to be considered in Oakes' model are resource indicators within the school. These classify the school by its racial and SES makeup, and look at things such as for-pupil expenditures, teacher salaries, pupil-teacher ratios, and class size. Are the schools within a district different in a way that is related to the socioeconomic and racial makeup of the school? At the elementary level we should keep track of the instructional time spent in various subjects, again by SES and racial makeup of the school. We should look at participation by race and SES in high school courses, and the ratio of course enrollments to the proportion of groups in the school population. How disproportionate is student representation in courses like calculus or academic chemistry? What is the distribution of curriculum resources like laboratory facilities in instructional processes?

Schools must have a plan for raising minority achievement. Plans to boost achievement should contain supplemental programs, extracurricular activities and programs, staff development programs, curriculum development efforts, and special guidance programs. Data collected for process indicators can help keep track of these five elements.

The Chief State School Officers are working on two projects that are helping us determine the extent to which we will be able to monitor this kind of comprehensive information at the state level. In one project we are looking at the core database in education, which is collected by each state. We find, from the demographic indicators on a state level, that states do not have standard data on the locale of their schools, whether they are urban, suburban or rural, or what types of neighborhoods these school serve. School enrollments are not cross-tabulated by race or sex. We have no standard SES indicator for schools that is collected and used by the states.

The national core database for outcomes shows that state-level data that classifies graduates by school and racial or ethnic group is not generally available. Some states have it, some don't. We don't have standard dropout data at the state level. We don't have standard dropout data at all; most states don't collect dropout data by student characteristic.

In the second project, undertaken in collaboration with the National Science Foundation, we are looking at the math/science indicators that are collected and used by each state. Thirty-five to

forty states have achievement data in subjects like math, science, and reading. We are currently studying whether they report that data by race, sex, and SES. Similarly, four to seven states collect attitude and interest information. We are finding out now if they report that by student group. Seven states keep track of the post-secondary majors selected by students and they break that down by racial or ethnic group of the student--but only seven states. One state monitors time spent in different subjects in the elementary school by group of students served--but only one state. Ten states monitor student enrollment by subject and ethnic group.

Thirty-eight states--I think this is kind of surprising--only thirty-eight states regularly keep track of the ethnicity of their teachers. Forty-eight keep track of teacher assignments and certification. That information could be broken down by the kinds of students those teachers serve. We don't know yet, but I think that relatively few states are doing that now. Only four states observe teacher performance. If we wanted to know if teachers perform better with advantaged versus disadvantaged students, we would not have the information to do so.

Only ten or eleven states keep track of the amount or type of professional development programs provided to teachers, only two states keep track of the extent to which teachers are involved in voluntary professional enhancement activities. Twenty-three states have the potential of monitoring teacher knowledge of their subject matter. Thirty-six states keep track of pupil-teacher ratios and fifteen or sixteen record the classroom resources that are provided. We don't know yet if any of these data are broken down by the type of student served.

The main point is that the rudimentary information a state level policymaker needs to determine if his school system is meeting equity concerns isn't even available. We don`t have the basics, let alone the breakdowns by student type that we need to monitor these issues. What I see as the first and most important problem is that people simply don't have a strong model and rationale for monitoring these equity concerns. I think this is where Oaks' model of the distribution of excellence has made a contribution.
We intend to get our people to do some thinking about how they might apply such a model within their individual states.

Secondly, we are running into tremendous resistance to change. Existing data are sacred, and there is a horrendous inability on the part of state and local school people to change it. They think if they redefine the data or add information, somehow their continuity with the past will be broken. I don't know if this is the issue in every case, or if people just don't want to do additional data collection. There is a tremendous, tremendous resistance to change. We proposed last year that states start collecting standard demographic data on school enrollment in every school in the country, including the sex and race breakdowns within each school--not by grade, but by the school as a whole. We ran into tremendous resistance on the part of state data collection people.

There is also something of a money issue. I think it is less of an issue when it is a matter of expanding and tuning the existing data collection system, in which we now invest relatively little. A little bit of money would help us all offset some of the additional costs.

In order to take the recommendations that people have been making in this conference, the recommendations have to be translated into objective data that can be used to keep track of how the school systems are doing in regard to underachieving minorities. We aren't very well equipped to provide and use that data right now, at least among our constituents. There is a need to reformat data collection, and in many cases, add to the data collection that already takes place in schools. People have to accept that the value and importance of the information is worth the restructuring process, even if it increases the burden of collecting the data. We have a lot of work to do.

THE ROLE OF TESTING AND EVALUATION

Persistence and Patience

Todd Endo
Director of Research and Evaluation
Fairfax County Public Schools

> Commitment to the academic success of black students clearly requires a sensitivity to the need for resolving these crucial cultural conflicts between school and community. Persisting in the face of these conflicts is more than many students, who see themselves as powerless, can manage. The teacher must affirm those behaviors needed to demonstrate achievement in the larger academic community, while simultaneously understanding the cultural and learning style diversity that the minority student brings to the learning environment.[1]

Like the teacher and the student who must learn to persist in the face of conflict and difficulty, the school system that seeks to improve the achievement of minority students must persist as well. Brilliance, creativity, and political savvy are all desirable. Technically sound analysis and use of data (even disaggregated data) are necessary but not sufficient steps to be taken. Persistence, patience, and just plain plugging along are mundane but vital ingredients that spell the difference between a good plan and a successfully implemented program.

The Fairfax County Public Schools is in its second full year of implementing a series of activities designed to improve the academic achievement and aspirations of minority students. The Fairfax program features school-based planning, implementation, and evaluation to match the identified needs of the students, implementation, and evaluation to match the identified needs of the students, skills of the staff, and potentially effective strategies for improvement in individual schools. School-based planning is conducted within a central mandate and framework. Other key ingredients are a sufficient timeline to develop and implement activities, additional resources of money and time, intensive support and assistance from central and area offices, careful monitoring and feedback, and above all dogged persistence and patience.

As the program has developed, there has been a continuing struggle to keep it on course. The temptations have been to speed up the process, to direct more and nurture less, to treat all schools like identical parts of the machine, to look for blueprints for the quick fix, to simplify the expected outcomes to standardized test scores, and to wash away the emphasis on minority student achievement in the tide of competing priorities and crises.

By the end of the first full year of implementation in 1985-86, modest improvement in minority students' achievement occurred. However, being in only the second year of implementation, we must persist through the full stages of implementation and be patient before judging the success of Fairfax's minority students' achievement program.

This paper first describes briefly the Fairfax program. Then it develops in more detail selected, important aspects of the program. Finally, the paper discusses some dilemmas, tensions, and unresolved issues in the program.

Background for the Fairfax County Program

Planning

In the summer of 1983, the Fairfax County Public Schools established a staff study group[2] which analyzed 1982-83 school achievement data to determine the status of minority students' performance. The study group purposely chose to examine regularly collected data that were broader than just standardized test scores. The eight indicators of achievement that were examined included:

- retentions in grade
- enrollment in higher level and lower level courses
- grades
- placement in special programs
- attendance
- dropout rates
- post-secondary school educational plans
- standardized test scores

Data on these eight indicators of achievement were analyzed by four ethnic groups: white, black, Hispanic, and Asian. Inclusion in a

specific ethnic group was determined by the response of parents on the student's enrollment card to a question that used the categories provided by the U.S. Office of Civil Rights.

The study group concluded that the achievement of black and Hispanic students was unacceptably low and below that of white students on nearly every indicator examined.

To address this identified problem, the study group concluded that the most promising strategies were directly related to the factors identified in the research on effective schools and effective teaching, namely: administrative leadership, high expectations for all students, defined instructional objectives, an orderly environment for learning, systems for regularly monitoring student learning, and parent and community support. The study group further concluded that improvement in minority students' performance was achievable as part of a long-range plan for school improvement that would benefit all students. Specifically, the study group proposed the following elements of a successful plan:

- Establishment of a major, long-range school board priority to improve minority students' academic achievement and aspiration

- Leadership from the superintendent and other top school system leaders through providing direction, announcing expectations, generating momentum, and providing visible support and attention

- Development of local school improvement plans which address the achievement and aspirations of minority students within guidelines established by the school board and superintendent

- Commitment of additional resources (time, money, and staff) and the reallocation of some existing resources over an extended period of time

- Development of a systemwide plan for program and staff development based on the effective schools' research and the sharing of successful strategies for improving minority students' academic achievement

- Provision of additional evaluative tools and training to teachers and principals to monitor student achievement.

Implementation of the Program

Although the implementation of the minority students' achievement plan has evolved since its beginning in 1984-85, it basically has stayed true to the vision expressed in the initial staff report. The balance between direction, support, and monitoring by the school system and the development, implementation, and evaluation of school-based plans by school staffs has been critical.[3]

Central Direction

The school board, superintendent, and top level staff persistently announce that the improvement of minority students' achievement is a major school system priority and that they expect the multiple indicators of achievement to show improvement over a number of years. This priority and direction are reflected consistently in the superintendent's annual operating plan for the school system, the divisionwide plan for the improvement of minority students' achievement, publications, speeches, remarks at school board meetings, memos, and a variety of other means of communication.

The divisionwide plan issued at the beginning of the 1985-86 school year stated a series of objectives and evaluation strategies that relied on the eight indicators of student achievement used in the study. At the same time, the superintendent emphasized that while he planned to monitor results in terms of student outcomes, he believed that the best place for program planning and implementation was at the school level. He also indicated that the role of the central and area offices was to "support both divisionwide emphases and school-community identified objectives." This focus on school-based planning was also contained in the superintendent's annual operating plan. He directed the schools to develop, implement, and evaluate plans according to an established time schedule and committed systemwide resources to support the schools' efforts.

School-Based-Planning

The central element of the program is school-based planning. The process involves an annual cycle of activities:

- Development of final objectives, strategies, and evaluation plans in the early fall
- Submission of plans by the end of October
- Review of plans and return of individualized written responses to principals by the superintendent in November
- Implementation of the plans throughout the year beginning in September
- Collection and analysis of data at the school throughout the year
- Review of activities, progress, and concerns by the area superintendents and the deputy superintendents at mid-year
- Submission of an annual evaluation report in June that reports results and discusses implications for the next year's plan
- Review of evaluation reports and return of individualized written responses to principals by the superintendent in July that include advice and requirements for the next year's plan
- Repetition of the cycle

Often merely a paper exercise, this process gains vitality through a number of strategies. First, school system leaders visibly and repeatedly announce their intentions and expectations. Second, they follow up by personally showing specific interest by responding to individual school plans and reports, participating in mid-year review meetings, visiting schools, and discussing evaluation reports. Through these interactions, they encourage collaborative planning by members of the school community, recognize differences in plans due

to differences in school circumstances, encourage changes in plans if the situation or data calls for them, and support continuity in plans if all is going well. Third, central and area offices provide extensive and intensive support and assistance.

With the steady stream of new priorities that flow across the experienced principal's desk, it is no wonder that his or her typical response to another new priority is "this too shall pass." Visible persistence is required to convince principals that the minority students' achievement priority will remain. The school system leaders reinforce the message that they mean business by committing the resources and giving the assistance necessary to enable schools to succeed.

Persistent reinforcement is also needed to convince school staff that their ideas are sought and that good school level plans will be approved. Many school staff are in the habit of trying to guess what the superintendent wants. Top-down management is part of the system culture. Principals, with good reason, often greet the call for bottom-up initiative with skepticism.[4]

Schools developed their first plans in the fall of 1984. Because of the late start, the first full planning and implementation cycle was completed in the 1985-86 school year.

Individual school plans addressed one or more of the eight indicators specified by the school system. In addition, they developed objectives and activities determined by the school. These included quantity and quality of student writing, reduction of disciplinary problems, more parental involvement, greater participation in school activities, and progress through reading text books.

Systemwide Support and Assistance

The school system supported its plan with action that gave credibility to its claim that minority students' achievement was indeed an ongoing priority:

- Beginning in 1985-86, money was set aside to fund school-based proposals. This strategy not only provided additional resources to schools but also reinforced the

notion of school-based plans. The total available funds for grants has increased steadily to meet demand.

- Also in 1985-86, a coordinator was hired and resource teachers were provided to manage the program and provide assistance to schools.

- To help schools plan and implement, written models were provided, workshops were conducted, and individual assistance was given.

- To help schools monitor and evaluate the effects of their strategies, resource manuals were provided, workshops were conducted, group and individual assistance was provided, and on-going follow-up was provided at the individual school level.

- Systemwide staff development programs were offered to volunteer school staff. Examples included the Teacher Expectations and Student Achievement (TESA) program and the Classroom Management Training Project begun in the 1984-85 school year. These programs reinforced the idea that strategies to improve minority students' achievement can be integrated with strategies for school improvement.

- Centrally based activities were conducted to pursue the system's direction and to support school-based activities. Examples included a review of procedures to select students for special programs, training for guidance counselors, overall coordination of the program, review of proposals for school-based grants, and initiation of some instructional programs.

- Related initiatives were linked to the minority students' achievement priority. For instance, for the 1985-86 school year, the school board approved a proposal written by a group of principals to allocate additional resources to schools with a high proportion of students with special needs. In addition, in the spring of 1986, the school board approved the superintendent's recommendation for a new priority "to develop a system for school-based management."

The provision of supplemental resources was crucial to convince schools that the school system was serious. Perhaps more important were the individual attention given to schools and the accompanying message that school-based efforts were indeed supported. For rhetoric to become reality, persistent effort was required as evidence.

School System Monitoring

Based on the original staff committee report, an annual report on minority students' achievement is issued each year in the fall. The report provides system level trend data by ethnic group on each of the eight original indicators. This report is presented at a school board meeting and publicized through the media.

In addition, analyses are conducted to answer specific questions about subsets of schools or students. These analyses are provided to the requestor on an ad hoc basis.

Moreover, area superintendents monitor progress through their related planning process. As mentioned earlier, they review the individual school plans and evaluation reports. They also are provided school level data on their schools for use in supervision.

Schools are provided data on their students using the same indicators and ethnic group classifications used for the systemwide report. They use these data for planning, evaluation, and reporting purposes.

Finally, a community advisory board reviews the process and progress and gives advice to the superintendent.

Results to Date

School plans were developed during the 1984-85 school year and the first full year of implementation was the 1985-86 school year. The annual report issued in October 1986 provided trend data for four years culminating in the first full year of implementation. The summary of the report stated:[5]

> During 1985-86 the standardized test results showed improvements, especially for black students. Of all ethnic

groups, black students made the greatest gains on the SRA tests over the last four years. In grades 8 and 11, black students have made gains each year, increasing cumulatively by as much as ten percentile points in grade 11. On the Virginia Minimum Competency Test, the percentage of black students who passed the tests increased substantially in 1986.

In addition, the percentage of black students scoring above the 50th percentile increased by three percentage points over the three year period. Other minority groups improved on this measure slightly, while the performance of white students declined slightly. The percentage of black students scoring below the 20th percentile declined by four percentage points over this same three year period, while the performance of all other groups stayed the same on this measure.

On the other seven indicators of achievement, the message was mixed. Placement of black students into programs for the emotionally disturbed and mildly mentally retarded showed steady declines over the four year period. The intention of black students to attend a four year college steadily increased. On the other indicators, no strong trends were noticeable. The report concluded:

Clearly, minority student achievement is not at the levels it should be. While the first full year data in this report show some progress, justifying the Board's long-term commitment, only in the long term will minority achievement reach satisfactory levels.[6]

Next Steps

Fairfax is now in the second full year of implementation of its minority students' achievement activities. For this year and the foreseeable future, reinforcement of the existing activities is planned. We expect that persistence will pay off.

In addition, some new activities are planned that reflect a more advanced stage of development. For instance, promising school-based practices will be identified and described. In printed form and through personal contact, school staff will share these practices with their peers. Perhaps grants will be given to schools so that they may adopt and adapt promising practices developed by others.

Also, because the program is approaching the end of the second full year of implementation, longitudinal data will be available on students. For example, students from the four major ethnic groups with similar achievement in grade 6 will be tracked on subsequent indicators of achievement, such as test scores, enrollment in higher level and lower level courses, grades, and placement in special programs.

In the next few years, the minority students' achievement emphasis will be integrated with and reinforced by other major school system initiatives. Clearly, the emphasis on school-based planning will be reinforced by the school board and superintendent's priority to develop a school-based management program. As part of this program, a new process for selecting, training, assigning, and evaluating principals and other school-based administration is being developed. This new process should help clarify the role of all administrators and enhance the possibilities for success of both school-based management and the minority students' achievement emphasis.

Also related to the minority students' achievement emphasis is the school system training based on *The Skillful Teacher*,[7] a generic instructional and supervision model developed by Jon Saphier. This model provides the framework for the instructional focus expected of school-based administrators and teachers, and is integral to the new performance evaluation program being developed in Fairfax. The cumulative effect of these initiatives will be to enhance the role of school-based staff to design, implement, and evaluate improved instructional strategies with a particular emphasis on minority students.

CONTEXT AND ASSUMPTIONS OF THE FAIRFAX PROGRAM

The Context is Fairfax County

The process for improving the achievement of minority students described in this paper may be suitable only for Fairfax County. Just as there is no one best educational system, there is no one best strategy for improving the achievement of minority students.

Fairfax County is a large, metropolitan school district in which minority students represent about 22 percent of the enrollment. Fairfax has sufficient staff and financial resources to support minority students' achievement programs as well as most other identified priorities. Most students achieve well and the public is generally happy with the school system. Standard operational functions relating to personnel, budgeting, accounting, purchasing, planning, and transportation generally happen routinely. A standard framework for curriculum and instruction is in place. Basically, this is so because the school-based staff and centrally-based staff are competent and have put into place systems to handle the routines. Though not without crises, Fairfax can afford to build on a solid foundation and plan carefully selected strategies for improvement.

Assumptions Underlying the Fairfax Program

The Fairfax program is built on many explicit and implicit assumptions, which rely on much of the research on effective schools and school improvement. However, competing models are also based on research.[8] Without discussing which model is more true, I will state some of the assumptions of our program:

- The school is the basic unit of school improvement.
- The school board and superintendent should establish priorities and give general direction, but a school staff is in the best position to develop the specific plans to enable its school to move in the desired direction.
- The emphasis on minority students' achievement is not an add-on and should be integrated with systemic efforts to improve instruction.
- There is no magical solution or panacea. The task is to put together a set of available ideas and commit the system to implement the ideas with sufficient resources over an extended period of time.
- The improvement process takes time.
- The improvement process requires varied strategies to provide support and supervision.

The remainder of this section of the paper will expand on each of these assumptions.

The School is the Basic Unit for Improvement

Fairfax recognizes that the desired improvement at the school system level is composed of improvements made school-by-school and teacher-by-teacher. In addition to systemwide activities, great efforts must be expended in each school.

The focus on the school implies a recognition that the whole is greater than the sum of its parts. That is, while the individual teacher is important, the school is more than a collection of individual teachers. In fact, there is a need to break down some of the isolation that teachers and administrators feel, to develop more collegial and collaborative relationships, and to develop a sense of a common school mission.

From this perspective, a school system could impose a uniform program and then implement it school by school. Fairfax took a different tack.

School Staffs are in the Best Position to Plan and Implement Activities within Their School

This statement contains within it a number of further assumptions. First, because each school is different, the school system should be careful what it demands that all schools do. The superintendent has stated that he wants to hold principals accountable for results and give them flexibility in terms of the means.

Second, most principals and teachers have sufficient skills, interests, and ideas to be entrusted with the development of school-based plans. In most schools, the principal and teachers can learn even if the central office is not teaching. Just as higher expectations for students are desired, the assumption is that high expectations for school staffs will lead to higher achievement.

Third, if the staff is more involved in making program decisions, their commitment to the effective implementation of these decisions will be greater and the results for students will also be greater.

Central and area office staff tailor their support and assistance to the needs of the individual school and principal. While some large group instruction is given, most activities are designed for small groups of likeminded staff or for individuals. This strategy is similar to a teacher designing total class, small group, and individualized instruction.

Minority Students' Achievement is Not an Add-on

Since there is a tendency to view a new initiative as an addition to the existing program, Fairfax is emphasizing that minority students' achievement activities should be integrated into the on-going instructional program, not added on to it. Therefore, Fairfax is encouraging improvement in the regular functions of a school; for instance, counseling students into existing higher level courses, better monitoring of individual student progress, involving more parents of minority students in the ongoing life of the school, improving teacher expectations, examining screening procedures for special programs, and focusing on writing or thinking skills across the curriculum. Fairfax is not encouraging greater grouping of minority or underachieving students or pulling out identified students from regular classes for special instruction.

There is No Magical Solution or Persistence Pays Off

The superintendent has emphasized that there is no magical solution to the problem of improving minority students' achievement and that only a persistent effort over a number of years will succeed. A review of what the school system and each of the schools are doing reveals no dramatically new instructional ideas. The ideas are good but were culled from personal experience and reflection, discussions with colleagues, and insights from external publications and workshops. What does contribute to success is the persistent attention paid to planning, implementation, and evaluation. Persistent attention means that the improvement process takes time.

The Improvement Process Takes Time

The downfall of many new initiatives is the belief that policy decisions are self-implementing or are easy to implement. By their statements and actions, the school board and superintendent are attempting to resist the pressure to speed up the process. The

superintendent has emphasized the need for a long-term persistent effort that will yield slow but steady improvement. On many topics he has been quoted to say, "Just because we've planted the seed and it's germinating doesn't mean you can keep picking up the plant and looking at it every day." The school board considered the annual report, presented in October 1986 after the first full year of implementation, to be a progress report, not a summative report on the program's successes or failures. In the mid-year reviews, the deputy superintendents stressed that the priority will remain for the foreseeable future because the improvement process takes time.

A second dimension of time is the "life space" needed by all staff, but especially principals and teachers, to plan, implement, and evaluate school board plans thoughtfully. A principal's and teacher's day is full of countless important and mundane events. It is too much to expect that school staffs will plan effectively on top of everything else they do. Time as a resource must be provided. This kind of time to plan, implement, and evaluate can be provided in three ways. One is to take away other tasks (e.g., some competing priorities, some unnecessary meetings, some externally or internally imposed expectations, some paperwork). A second way is to provide substitute days and days before or after the contract year. A third way is more a state of mind than real time. We assume that when a staff believes it is the creator and owner of the plan, it willingly commits additional time to do the right job and to do the job right. When faced with the task of implementing a school system mandate for which it feels no ownership, we assume that a school staff tends to devote only enough time to comply.

The Improvement Process Requires Varied Strategies to Provide Support, Assistance, and Supervision

Besides time, the school-based improvement process requires support from the central and area offices. As described in the section on "systemwide support and assistance," this support has taken the form of money, time for school staffs to plan, staff to coordinate efforts, and resources to assist school staffs plan and implement better.

Just as assistance is tailored to the individual school, so is supervision. Through the monitoring activities, some schools are recognized as being on the right track. For them, little change is demanded and praise is given. Deficiencies are noted in other

schools' efforts. The area superintendent supervises these schools more regularly, giving more explicit instruction and direction.

THE ROLE OF THE OFFICE OF RESEARCH AND EVALUATION

While many departments of the school system contribute to the effort to improve minority students' achievement, this section focuses on the role of the Office of Research and Evaluation (ORE) because the activities of this office illustrate most of the basic components of the program and because I know the activities of ORE best. Much of this section could also be written about the activities of the coordinator of minority students' achievement, the area minority student achievement resource teachers, and other area and central departments.

The Office of Research and Evaluation has played a central role in monitoring the achievement of minority students and in providing support and assistance to schools. Some ORE staff monitor the indicators of achievement for the school system, for identified groups of schools, and for individual schools. They provide data and analyses of data to decision makers, produce reports on the academic progress of minority students, and discuss the implications of the findings for program activities.

Other staff in ORE provide support and assistance to individual school staffs in the development and implementation of school-based plans. The process for support and assistance is tailored to the needs of the individual school staff and, thus, is time consuming. In its highest form, and ORE staff person meets with the principal and/or member of the school staff to plan a needs assessment, discuss possible elements of the school plan, propose alternative evaluation strategies, and review drafts of the school plan. In an intermediate form, the ORE staff provides intensive assistance to schools in the development of their evaluation plans, the implementation of the plans (including methods of collecting and analyzing data), and the writing of the evaluation reports.

In its most extended form, ORE has conducted two year projects with volunteer schools. These are designed to assist school staffs increase their capacities to identify, clarify, analyze, and use factors within the school in order to develop, implement and evaluate a long range, comprehensive plan for improving student achievement with a special emphasis on minority students.[9] The framework for this

effort drew freely from the experiences of the staff, from the writings of Fullan, Hall et al., Little, and Joyce and Showers on school improvement, leadership, and staff development, and from a variant of effective school projects across the country.

The major explicit tasks of the first year of the project were to help school staffs conduct a needs assessment at the school and develop a plan to address these identified needs. Behind these explicit tasks were two implicit but necessary tasks. These were to develop both readiness[10] in the staff to "own" the project and the staff skills in planning.

The formal activities of the first year included monthly meetings of the school-based planning team and two full day workshops on the planning process and planning objectives, activities, and evaluation strategies relating to identified needs. In addition, many informal meetings were held among the school staff and between members of the school staff and ORE staff. The role of the ORE staff was to initiate and develop, in conjunction with the principal, most of the planning activities for the monthly meetings and workshops; to circulate appropriate articles and otherwise link the school-based planning teams to useful resources; to develop data gathering instruments and analyze some of the needs assessment data; and generally to serve as a "sounding board" and consultant to the principal and teacher chairpersons.

By the end of the first year, each school had developed a school improvement plan. In the process, the planning committees developed strong collegial relationships, a sense of school mission to guide classroom responsibilities, ownership of the planning process and the plans, familiarity with much of the research literature, and knowledge and skills related to data collection and analysis.

The second year featured implementing the plan and evaluating activities. The major responsibility for the project shifted to the school staff. The ORE staff still conducted workshops and influenced events, but their role became more one of support than of leadership, of responder than of initiator. Major emphasis in the second year was on broadening the staff's repertoire of evaluation strategies and developing real use of selected strategies for school-based improvement. The repertoire included systematic use of peer and principal observations, teacher and student interviews, report card data, office records, basal test information, anecdotal records,

instructional grouping information, teacher and principal anecdotal records, instructional grouping information, records of attendance and participation, and various types of standardized and teacher-made tests. By the end of the second year, each school had completed the first year's implementation and the first report of progress.

School-Based Evaluation is Not as Easy as It Sounds

We were surprised by how hard it was for some schools to develop school-based evaluation plans that would help them improve their programs. Use of data by school staffs to help improve instruction for students did not occur just because the data was available and technical assistance was given. Our reflections on the reasons for this difficulty may offer insight into the change process and why it is necessary to persist over time.

Talking about testing, a researcher once noted that everyone thought testing was important -- for someone else. Teachers thought testing was important for principals, principals thought testing was important for the superintendent, and the superintendent thought testing was important for teachers. But few people thought testing was important for themselves.

Similarly for evaluation, the prevailing image was hard to break. School principals and teachers generally had the view that evaluation was something done *to* them by *someone outside the school* usually with negative consequences. In planning evaluations, many of them initially focused on summative not formative evaluation, hard data not soft data, and pre-testing and post-testing. Perhaps because of the view that evaluations were negative accountability strategies, many principals tended to focus on activities they could control (e.g., number of staff development sessions held), rather than on outcomes for students or others. They tended to view evaluation as a game in which the object was to state objectives that could be accomplished.

Aaron Wildavsky, a political scientist, wrote an article, entitled "The Self-Evaluating Organization,"[11] that addresses some of these same difficulties. Wildavsky reflects on his intellectual journey-- "I started out thinking it was bad for organizations not to evaluate, and I ended up wondering why they ever do it." He explores why evaluation and organization tend to be in tension:

Evaluation and organization may be contradictory terms. Organizational structure implies stability while the process of evaluation suggests change. Organization generates commitment while evaluation inculcates skepticism. Evaluation speaks to the relationship between action and objectives while organization relates its activities to programs and clientele.[12]

As part of a school organization, then, principals and teachers were, at the least, in tension over the call to evaluate themselves.

It was only through persistent and intensive efforts that some progress was made in dealing with these tensions. Part of the success can be attributed to the distribution of a resource notebook for school-based evaluation, work-shops on the subject, technical assistance in small groups and individually, and more intensive effort such as that described in the previous section. Part of the success also resulted from persistent feedback that objectives should be stated in terms of outcomes, that use of non-test data is encouraged, that data derived from teacher journals are acceptable, and that non-attainment of objectives is more a signal to improve than to condemn. Much of the success also came from principals and teachers realizing that not only do good evaluation plans and reports gain external praise, but also that the data are useful to them as they seek to improve instruction. Finally, part of the success only came about because the ORE staff and the school staff persevered and eventually came to trust and rely on one another. Still, it would be foolish to say that self-evaluation is now the norm of the school system.

The School Improvement Process

What we experienced in the project reinforced our view that "change is a process, not an event,"[13] and that the process is a long and difficult one that requires more time and persistence than anticipated. A major reason for the length and difficulty of the process is the necessity for some basic changes to occur in the culture of the school, culture of the school system, and the perception of roles by principals and teachers. It is not easy for teachers and principals to move out of their isolation toward a sense of school community with a definite mission. It is not easy for teachers and principals to believe that they can make important decisions and to act on that belief by taking ownership of ideas and pursuing them.

It is not easy for colleagues to develop enough trust to open up areas of uncertainty, to question oneself and others, to make mistakes in front of others, to rely upon one another. It is not easy for a school staff to really believe that the central office is there to help them. It is not easy because control, compliance, hierarchy, isolation, and doing the thing right are stronger elements of the culture than school-based decision-making, collaborative planning, collegiality, mutual problem solving, and doing the right thing

Wildavsky and Judith Warren Little[14] discuss some of these difficulties and agree on some of the positive characteristics of improving and evaluating schools. Little describes "a norm of collegiality," while Wildavsky states that "an extraordinary degree of mutual trust" is a requirement of a self-evaluating organization. Our findings support that a context of trust and collegiality is a prerequisite for the honest use of data for self-evaluation.

Little also describes "expectations for analysis, evaluation, and experimentation: a norm of continuous improvement." She talks about the need for "aggressive curiosity and healthy skepticism" and concludes that "where analysis, evaluation, and experimentation are treated as tools of the profession, designed to make work better (and easier), and where such work is properly the work of the teacher, teachers can be expected to look to staff development to help provoke questions, organize analysis, generate evidence of progress, and design differences in approaches."[15] Wildavsky agrees on the need for a "climate of opinion that favors experimentation" and skepticism and states as an example that "organization members would have to be rewarded for passing on bad news."[16] Merely to state these points is enough to realize how far away most schools and school systems are. However, as Little and we have shown, in some schools such a supportive culture exists. But progress is slow. Persistence and patience is called for.

TENSIONS, ISSUES, AND DILEMMAS

Bottom-Up and Top-Down

This is purposely posed as a both-and statement. Minority students' achievement is both a top-down and a bottom-up enterprise. The trick is to know what to mandate from the top-down and what to encourage to emerge form the bottom-up. Basically we mandate from the top the expectation that minority students'

achievement will improve as measured by the eight indicators, the school-based planning process and format, and a monitoring system. At the same time we encourage local school initiative and creativity. Where it is difficult to know whether to operate bottom-up or top-down include the following situations:

- Reviewers of plans and reports conclude that the efforts of the school are inadequate and can be improved. When should the principal be encouraged? When should he or she be directed? When should he or she be removed?

- When is something deemed so good that it should be used more broadly? For instance, The Skillful Teacher training has been well received and next year all schools will be involved in the training. One consideration in the selection of this model was that it is generic and not prescriptive. Thus, within its framework, it allows great flexibility to accommodate individual teacher and school differences.

- When is there a window of opportunity that must be used even if the system and the schools are not ready? For instance, at a given time, the political climate may be right, important actors in agreement, or additional funds available.

There is a natural tendency and pressure to centralize this process. However, it is important not to overcentralize. Although it may seem more efficient to direct schools to implement the same strategy, the effectiveness of such an approach is questionable. For those who monitor the program, it is easier to feel that you know what's going on if all schools are implementing the same program; and it certainly is easier to describe. The parents, community, and other external audiences can more easily understand a centralized program and thus may develop greater confidence in the effort. It is hard to persist against these pressures and tendencies, but it is important to do so.

The Pace of Change

The resolve of the school board and superintendent to expect a slow but steady improvement in minority students' achievement runs up against the pressure to show results quickly. The black and

Hispanic communities are understandably impatient. The desire to show positive results in the local and national press is also understandable, as is the desire to compete with the neighboring school systems. Pressure to do it faster, cut corners, and be more efficient is hard to resist. It is easy to understand that Wood's readiness and maintenance phases of the change process frequently are short-changed.

Researchers and the Department of Education have warned against cookbooks (Finn), recipes (D'Amico), and the list mentality (Barth). The warning is appropriate but difficult to heed.

The Definition of Minority

The focus of the program can be on different groups of students and the choice can reflect different purposes for the program. In Fairfax there has been continuing discussion of the alternatives.

The initial school board priority emphasized improvement in the achievement and aspirations of minority students. In practice, the emphasis was placed on black and Hispanic students because the data indicated that Asian students were generally doing well. The priority purposely did not emphasize low achieving students in general or low achieving minority students in particular. The priority was intended to include the moderately achieving student who could do better as well as the low achieving student.

The continuing debate resulted in a change in the annual operating objective for 1986-87. This year's objective calls for "improving the academic achievement and aspirations of underachieving students, with emphasis on meeting the needs of minority students."

Focus on Test Scores

Test scores as a measure of student achievement are accepted by a variety of audiences. Researchers use test scores to judge the effects of a new program. The newspapers feature the results of the College Boards, norm-referenced tests, and minimum competency tests and rank school systems and schools on the basis of these. Parents, realtors, and the general public want to know what the test scores are. Yet, thoughtful principals, teachers, central office staff,

and researchers realize that test scores give only a partial picture of student achievement. If we want principals and teachers to take ownership of school-based evaluation, we must support the use of more than test scores as a measure of student achievement.

Fairfax consciously chose a variety of indicators of student achievement to assess the success of its efforts to improve minority students' achievement. Spokespersons consistently speak about all the systemwide indicators and the variety of school-based indicators in order to curb the powerful impulse to simplify the criteria to one only of test scores. It helps to use illustrations, such as the classic underachiever who has high test scores, uneven grades, and low attendance. It is also important to talk about what decisions are made as early as the sixth grade in order for a student to take and succeed in calculus in the twelfth grade.

A more powerful reason to emphasize indicators other than test scores may be emerging from our data. Test scores are rising, but most other indicators are not showing much, if any improvement. This may reinforce the view of the sometimes cynical principal who said that he could raise test scores, if that was what was wanted, even though student achievement would not improve. Use of multiple indicators will give a more complete picture of the changes.

Closing the Gap?

Most of the recent discussion concerning minority students' achievement talks about closing the gap between the achievement of minority students and the achievement of non-minority students. Fairfax has tried to resist this characterization of the goal. Instead, it has stated as its goal to "improve the academic aspirations and achievement of minority students." It has done this in order to compare minority students' achievement with itself or with the nation and not with other student groups in Fairfax.

An example will illustrate this difference. If the pass rate of minority students on the state minimum competency test increases by five percent, is the improvement any less if the pass rate of non-minority students also increases by five percent? For this reason, charting the change in the percent of minority students who score above the national norm on the test is more important than comparing the mean scores of minority and non-minority students.

It would be fine if the achievement of minority students improved and the gap is narrowed in comparison with non-minority students. But, the program can succeed if minority students' achievement improves even if the gap is not narrowed.

The Science and the Art of Education

> The prospectus for this symposium promised contributions to the creation of a science of education. I'm not sure my contribution will advance that cause. In my view education is more an art or craft than a science. Using creative analyses of available data is an important tool in the effort to improve the achievement of minority students and all students. But, in my view, data analysis is but one tool in the hand of a craftsman and not the most important one. My image of the good superintendent, principal, teacher, and even the director of research and evaluation is the master craftsman not the eminent scientist.

I hope that no one attempts to replicate the "Fairfax model" in their situation. What I do hope is that readers will run the ideas and experiences presented here through the filter of their experiences, values, beliefs, hunches, and situation and shape what remains into something that makes sense to them. Then, persist and be patient.

Footnotes

1. As I was finishing this paper, a new booklet appeared on my desk: Learning to Persist and Persisting to Learn written by Bessie C. Howard and published by the Mid-Atlantic Center for Race Equity in 1987. It caught my eye first because its title contained a major theme of this paper--that is persistence is a crucial factor. The booklet captured my attention because it was about improving the academic achievement of minority students. As I read the booklet, I realized that much of what it said about the conflicts between minority students and the routines and expectations of the school system could also be said about the conflicts between principals and teachers, who are instructing minority students, and the routines and expectations of the school system.

2. The background and implementation sections of this paper are adapted from three Fairfax County Public Schools reports. The first is "Minority Students' Academic Performance: A Preliminary Report"

issued in January 1984. The second is the "Report of the Advisory Committee on the Academic Performance of Minority Students in the Fairfax County Public Schools" issued in May 1984. The third is the "Report of Minority Students' Achievement for the 1985-86 School Year" issued in October 1986.

3. A useful think piece exploring a similar view in more depth is contained in Philip Schlechty's chapter, "District Level Policies and Practices Supporting Effective School Management and Classroom Instruction," in Regina Kyle's (editor) book, Reaching for Excellence: An Effective Schools, Sourcebook, Washington: U.S. Government Printing Office, 1985.

4. A description of a bottom-up activity in Fairfax County and thoughts on how to encourage more such activities is contained in a paper, "Bottom-Up from the Top-Down," by Todd Endo, and published in Reflections, a journal of the National Network of Principal Centers. Copies can be obtained from the author.

5. "Annual Report on the Achievement and Aspirations of Minority Students in the Fairfax County Public Schools," Office of Research and Evaluation, October 1986, Executive Summary.
6. Annual Report, Executive Summary, 1986.

7. Saphier, Jon and Gower, Robert, The Skillful Teacher Carlisle, MA: Research for Better Teaching, Inc., 1982.

8. A very thoughtful description and analysis of various models for school improvement and the development of effective schools is contained in Larry Cuban, "Transforming a Frog into the Prince: Effective Schools Research, Policy, and Practice at the District Level," a report for NIE (June 1983).
9. This section is a summary of a more extensive informal report, "Effective Schools Project Report, "written by the major developers of the project, Ann Cricchi and Mike Harrison of the Office of Research and Evaluation.

10. The term, "readiness", is used in the context of the RPTIM (readiness, planning, training, implementation, and maintenance) model described by Fred Wood et al. in "Practitioners and Professors

THE ROLE OF TESTING AND EVALUATION

Monitoring and Improving School Learning

Walter Hathaway
Portland Public Schools

Introduction

One of the greatest challenges facing American education in the second half of the 20th century has been the differences in achievement among students of different ethnic groups. Today, 33 years after Brown vs. Topeka, and 22 years after the Elementary and Secondary Education Act of 1965 propelled our nation along the road to equitable and excellent education for all children, there are signs that the achievement of minority students is beginning to catch up with that of nonminority students on a nationwide basis. The remaining gaps in achievement test scores and other indicators of student performance, however, are still large and perplexing. Excellent and innovative educational assessment and progress reporting has and can help us respond to that challenge both by targeting instruction on specific student needs and by focusing the attention of policy makers and other problem-solvers on the larger underlying issues. Dr. Ron Edmonds pointed to this promise of assessment in his seminal work on school effectiveness when he included "frequent assessment" as one of the key factors in improving schooling for all students but particularly for previously under-achieving minority children. (Edmonds, 1979)

The Portland, Oregon school district has pioneered a number of improvements in achievement testing and test results reporting that have helped teachers improve the performance of all students while reducing the achievement differences among students of differing background. The Portland district also is one of those who have begun to use test and evaluation data disaggregated by ethnic group to identify and respond to the needs of previously underachieving minority students by improving programs, policies, and resource allocations.

This paper first summarizes some of the national data on student achievement test results by ethnic groups. It then briefly describes some of the innovative features of the Portland testing program that have helped improve the effectiveness and equity of instruction. Finally it reports why and how the Portland School System has begun reporting and using disaggregated student and system data at each of the key levels in the system, what some of our initial findings have been, and what some of the effects of such reporting have been.

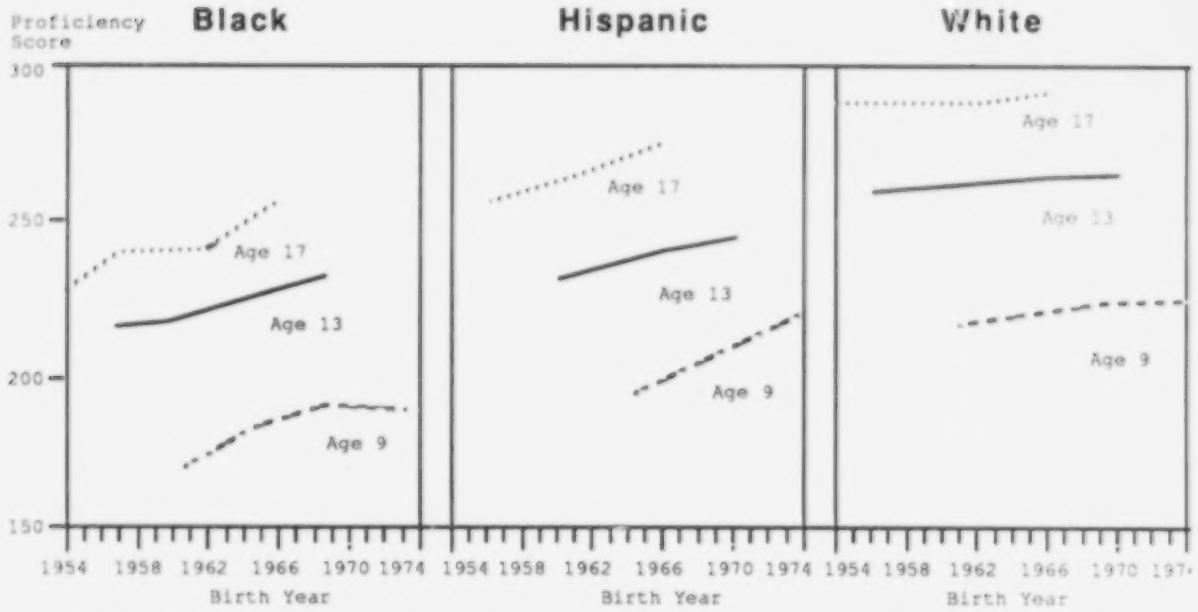
The National Achievement Gap

According to a recent report by the U.S. Congressional Budget Office, there is evidence from a variety of tests administered to students of various ages in different localities that:

> Recent years have seen a shrinking of the long-standing difference between the scores of Black and nonminority students on a variety of achievements tests. The evidence pertaining to other ethnic groups is more limited but there are suggestions of relative gains by Hispanic students as well. While the change has been small relative to the remaining gap between the minority and nonminority students, it has been consistent from year to year and could prove substantial over the long run (U.S. Congressional Budget Office, 1986, pp. 74-75). (See Figure 1)

Figure 1

Trends in Average Reading Proficiency for White, Black and Hispanic Students, by Birth Year



SOURCE: National Assessment of Edu cational Process, The Reading Repo rt Card (Princeton: NAEP/Eductional Testing Service, 1 985), Data Appendix.

Although this Congressional Budget Office report raises cautions about the limitations of the data upon which this trend is based, its authors conclude that the patterns observed seem genuine[1]

For example, they observe that in general, it appears that the average scores of students:

- Declined less than those of nonminority students during the later years of the general decline;
- Stopped declining, or began increasing again, earlier; and
- Rose at a faster rate after the general upturn in achievement began.

Recent evidence of progress toward diminishing the national achievement gap has, however, only begun to mute the sad, national litany of indicators of the severe educational achievement

disadvantage of many minority children. It goes beyond achievement data and includes:

- The dropout rate for minority students is as high as 80 percent, versus a national average of less than 20 percent for nonminority students.

- Minority students are often two to three or more grade levels behind on achievement measures. For example, the Southern Regional Education Board reports that on National Assessment Tests, "The reading achievement levels of Black eleventh-grade students is basically the same as for White seventh graders." (SREB, 1986, p. iv.)

- In 1985 Black students had SAT Mathematics and Verbal scores that were 115 and 103 points lower than White students. Hispanic student scores were 65 and 67 points lower.

- Black students are approximately three times as likely to be in a class for the educable mentally retarded but only half as likely to be in a class for the gifted and talented as White students.

- Only about one-third of the estimated 2.7 million limited-English-proficient students aged 5 to 14 receive special help congruent with their linguistic needs.

- Black and Hispanic students are two to three times as likely to be suspended or expelled and only half as likely to be enrolled in courses that lead to a college education.

And the list goes on.

Almost daily the Superintendents, Boards of Education, staffs, and communities of school systems such as those represented in today's symposium find themselves searching for answers to the serious and complex questions of equity, efficiency, and excellence in education posed by such differences. Their colleagues in other districts throughout the nation share this quest. The encouraging nationwide trends in reducing the achievement gap are due in large measure to such efforts.

The questions that continuously emerge as we strive to develop policies and programs to improve the academic and social performance of all our students and to regain the confidence and support of our publics include:

- How to improve student motivation and behavior and thus reduce such crippling and costly problems as dropouts, absenteeism, violence, and vandalism?

- How to better assess and improve the performance of our students and the effectiveness and success of our programs?

- How to better identify and respond to the needs of special student populations; e.g., the disadvantaged, the handicapped, bilingual and multicultural, gifted and talented?

- How to better select for and support improved staff competence in helping students gain academic, instructional, social, and personal skills?

- How to better gain and equitably utilize funding for our systems that is adequate and secure?

- How to improve communication with and involvement of our parents and community?

Answers to these pressing problems of education may be discovered if we continue to work toward creating:

- Accurate, accessible, and timely data on the nature and extent of the needs of our students;

- Valid, reliable, and efficient measures of the progress our students are making so that we can identify the programs and practices that help them overcome the impediments to success in school; and

- Field-based as well as fundamental research on new teacher and technology-based approaches to enhancing the productivity of instruction and schooling in responding to our students' needs.

The Portland, Oregon school district is one of those which has taken the data-based research and evaluation approach to defining and seeking answers to the perplexing educational, social, moral and political problems of differences in average levels of student achievement among student groups of differing ethnic backgrounds.

The Portland Experience

It was to help us answer questions such as the above that led the Portland, Oregon school district to develop an innovative testing system and to begin analyzing and reporting student achievement data as well as other student performance and status data by ethnic group.

Testing and Test Results Reporting Innovations

A decade and a half ago, a small group of researchers and test developers in the Portland, Oregon School District realized the potential of Item Response Theory for developing tools for better educational measurement.

The purposes we wanted our citywide testing programs to support included equitable, effective, efficient, valid, and reliable:

- Grouping and placing students
- Targeting instruction on individual student learning needs
- Evaluating student progress over time
- Identifying neglected areas of the aligned curriculum and evaluating and improving programs and services at the student, classroom, grade within school, and grade within district levels
- Providing accountability to the school board and the community

In order to meet these needs, we needed an educational measurement system that would answer the following questions:

- Is the current *rate of gain* of this student, class, grade, or program satisfactory compared to his/her/its age, grade,

program mates and the previous pattern of gains observed?

- What are the current *strengths and weaknesses* (in terms of goal areas needing further diagnosis and possible work) of this student, class, grade, school, or program, and how have they changed over time?

- Is the *level* at which this student, class, grade, or program currently performing satisfactory compared to his/her/its age, grade, or program mates and the previous pattern of levels observed?

We could not find any available measurement program that would help us answer these questions and meet these needs adequately, and so we set out to build one ourselves.

There followed a period of extensive collaborative research and development, much of it within the framework of the Northwest Evaluation Association, which was created to foster regional cooperation in and mutual benefit from this effort. The result today is a system of three comprehensive basic skills Rasch calibrated item banks in Reading, Mathematics, and Language Usage. The constantly growing item banks in Reading and Language Usage each have over 2,000 field-tested, calibrated items linked to a common, continuous curriculum scale for each subject. The Mathematics item bank now has over 3,000 such items. State and local school systems including Portland have been using these item banks since 1977 to construct effective, efficient survey achievement tests, competency tests, and other instruments that combine the best qualities of criterion-referenced and norm-referenced measurement. These excellent measurement systems have been the cornerstones of state, district and school renewal efforts that anticipated "A Nation at Risk" (Gardner, 1983) by at least five years. The ongoing collaboration is now resulting in similar item banks in Science and Direct Writing, and yet another in Social Studies is on the drawing board.

Some of the characteristics of the testing and test reporting system developed by the Portland School District which improve school and classroom effectiveness include:

- Matches the local curriculum.

- Emphasizes student gain over time (rather than just level of

performance at the current time).

- Gives every student a challenging testing experience at which he or she will succeed (functioning level testing).

- Reports goal areas in which students may need help as well as overall performance in each subject.

- Monitors student progress toward mastery of graduation competency requirements starting with the beginning of third grade.

- Invites parent involvement with teachers in planning to help students learn better.

Two additional computer-based testing and test reporting innovations on which we are working are:

1. Offering district-wide a school-based microprocessor test reporting system. Over the past two years, a group of seven principals, along with the data processing department and the research and evaluation department, have worked to develop this computer system for local building controlled reporting and analysis of test data. The pilot system began with four goals in mind. We were interested in finding a program that would run on building microcomputers that would accomplish the following:

   a. Provide a complete individual student test history to building staff immediately on request.
   b. Produce test reports by instructional group.
   c. Provide analyses of longitudinal student group data when and as the building needed them, and
   d. Improve the turnaround time of test reports.

   We now have a program which gives local buildings the ability to meet these four goals and we have offered it to all schools in the district.

2. Creating a school-based computer adaptive testing system which allows building personnel to continuously monitor the progress of students as they advance through the basic skills curriculum. This system involves putting a sufficient bank of field-tested

and calibrated items inside a computer along with the requisite software to build a unique, individualized test for each student at the time when building staff feel it is needed.

The advantages of this system include:

- Increased measurement accuracy
- Increased testing flexibility
- Improved use of testing as an integral part of the instructional process
- Enhanced test security
- Decreased testing time
- Increased ability to measure high-level educational goals such as problem solving
- Immediate feedback of results

Our research and evaluation department has mounted the pilot CAT program in cooperation with the information services department, directors of instruction, and principals. The purpose of this pilot is to gain the information necessary to design a cost-effective CAT system that will serve the future testing needs of all our students and our schools.

Tested theories of effective education now reveal what we must do to improve schools and to help every child learn as much as he or she can as effectively and efficiently as possible. They indicate that our educational leadership must support the development of learning environments in which the following sorts of things happen for each of our students:

- His or her current, most pressing learning needs within a well planned curriculum, must be identified.

- The student must be helped to set clear, relevant, attainable learning objectives to meet those needs.

- He or she must be expected to succeed in attaining the learning objectives and must want to learn them.

- The student must receive individualized instruction directly related to the learning objectives designed to meet his or her current learning needs.

- The learner must use the time allocated for instruction to work intently and seriously on the task of learning.

- The student must know when he or she has succeeded and when not, and must experience a reinforcing sense of accomplishment and achievement as a result of knowledge of success.

- The learner must receive and return a sense of caring, personal concern, interest, respect, and commitment which provides the psychological support necessary to want to learn and to work to learn, and finally

- The student must receive and accept parental and community support and encouragement for success in learning.

The main barrier to our putting such models of effective instruction and education into practice up until now has been the lack of accurate data and information about:

- Each student's individual learning-needs.

- What learning activities and experiences are matched to diagnosed student needs and to established learning objectives and how to help the student engage in such tailored instruction in a timely fashion.

- When the student has mastered the objectives and is ready to move on.

- The degree of overall success of staff and programs in promoting student learning, and

- What is and is not working to help students learn.

We are now, however, at long last beginning to evolve the comprehensive assessment and information systems needed in order to create the more effective, equitable, and efficient education systems required for real and meaningful educational reform and even reinvention of schooling.

Guiding Values, Principles, and Goals of the Portland Effort

The Portland initiative in using assessment data to improve school effectiveness, especially for under-achieving minority students, is founded upon the following values, principles, and goals:

- **All students can learn.**

We categorically reject the suggestions in some quarters that the observed differences in the achievement levels of students of various backgrounds are intrinsic. Instead we believe that the barriers to high levels of achievement by all students are surmountable and that research-based solutions can be used to create schools in which all students achieve at levels which will help them be productive members of society while meeting their personal goals.

- **Helping all students learn up to their maximum potential will require complex solutions to complex problems. There are no simple solutions or panaceas.**

We recognize that the existing research on obstacles to student achievement indicates that the underlying problems are:

> often long-term - beginning as early as the prenatal environment; and both complex and pervasive - with elements being found in the home, community, peer, and school environments and cultures.

We have resisted the temptation to extrapolate from current trends and to project when the "achievement gap" will be closed. We are using the best data available at each level in the system to understand why some students are not currently making the progress or performing at the levels we hope and we are developing and carrying out collaboratively developed plans to raise the achievement of each individual student and each student group now lagging behind.

- **Teachers, principals, students, and parents are vital partners in this effort.**

Disaggregated Reporting

A key event in the maturing of this commitment was the decision of Superintendent Matthew Prophet and the Board of Education in 1985 to begin issuing an annual report entitled *A Statistical Portrait of the Multicultural/Multiethnic Student Population in Portland Public Schools*.

This report represents only the "tip of the iceberg" of the district disaggregated data reporting system which extends to every level of the school district. It pulls together relevant district-wide analyses of data on culturally diverse children in Portland Public Schools to assist district decision makers in developing a general understanding of the status of these children in the district. The district-wide report presents findings in which the district bases planning of its efforts to address concerns regarding culturally diverse children. Similar data is reported and used at the program, building, and classroom levels. This promotes problem identification and solving at each key level in the system.

At the district level the availability of disaggregated data helps the Superintendent, the Board of Education and the Administration to work with the community to muster resources and to formulate and monitor efforts to raise the achievement and education levels of all students, especially those lagging behind. Data-based research and evaluation on the causes of and solutions to problems causing lack of educational progress become possible at every level. Program directors and building managers are helped to monitor and improve their units' efforts to bring about improvements. Teachers and others directly involved in instruction can evaluate and improve the effectiveness of their efforts to help all student groups and individual students progress through the curriculum. It is reasons such as these that have led Portland to take research, evaluation, and assessment-based approaches to understand and respond to the needs of under-achieving minority students.

This district-wide report of data disaggregated by ethnic group was undertaken in collaboration with the district's Desegregation Monitoring Advisory Committee, a consortium of representatives of community groups concerned about equitable and excellent education and for education that is truly multicultural. The District's Management Information Systems group coordinated the data collection, analyses and reporting effort. The assistance of the

Northwest Regional Laboratory was obtained in designing and developing the initial report.

The Portland Findings

The Portland School District registers its students as American Indian, White, Black, Asian or Hispanic. For the 1986-87 school year, the student enrollment was 73.0 percent White, 15.3 percent Black, 7.5 percent Asian, 2.1 percent Hispanic and 2.1 percent American Indian. The district has enjoyed a high level of desegregation and has never been under a court order to desegregate. It does have a voluntary desegregation/integration plan focused on improving student achievement and a Desegregation Monitoring Advisory Committee composed of representatives of community groups having a stake in educational equity and excellence.

In developing our district-wide Statistical Portrait of the Multicultural/Multiethnic Student Population in the Portland Public Schools to symbolize and carry out our commitment to collaborative problem identification and solving with our community, we used a variety of sources to identify areas of district-wide concern regarding culturally diverse children. These included concerns expressed by the lay public and local school personnel. In addition we conducted an extensive review of the current literature and media stories to gain a broader perspective on concerns of local relevance. Through this process, we have identified the following five general areas for analysis:

- *Student Achievement.* At what levels do culturally diverse children in the district demonstrate achievement?
- *Program Access.* To what extent do culturally diverse children participate in district programs?
- *Multicultural Curriculum.* In what ways does the district's curriculum address appreciation and knowledge of one's own culture or the cultures of others?
- *Teaching Personnel.* To what extent does the district's teaching staff reflect the cultural diversity of its students?
- *Policy Representation.* Do groups which formulate district policies reflect the cultural diversity of the students?

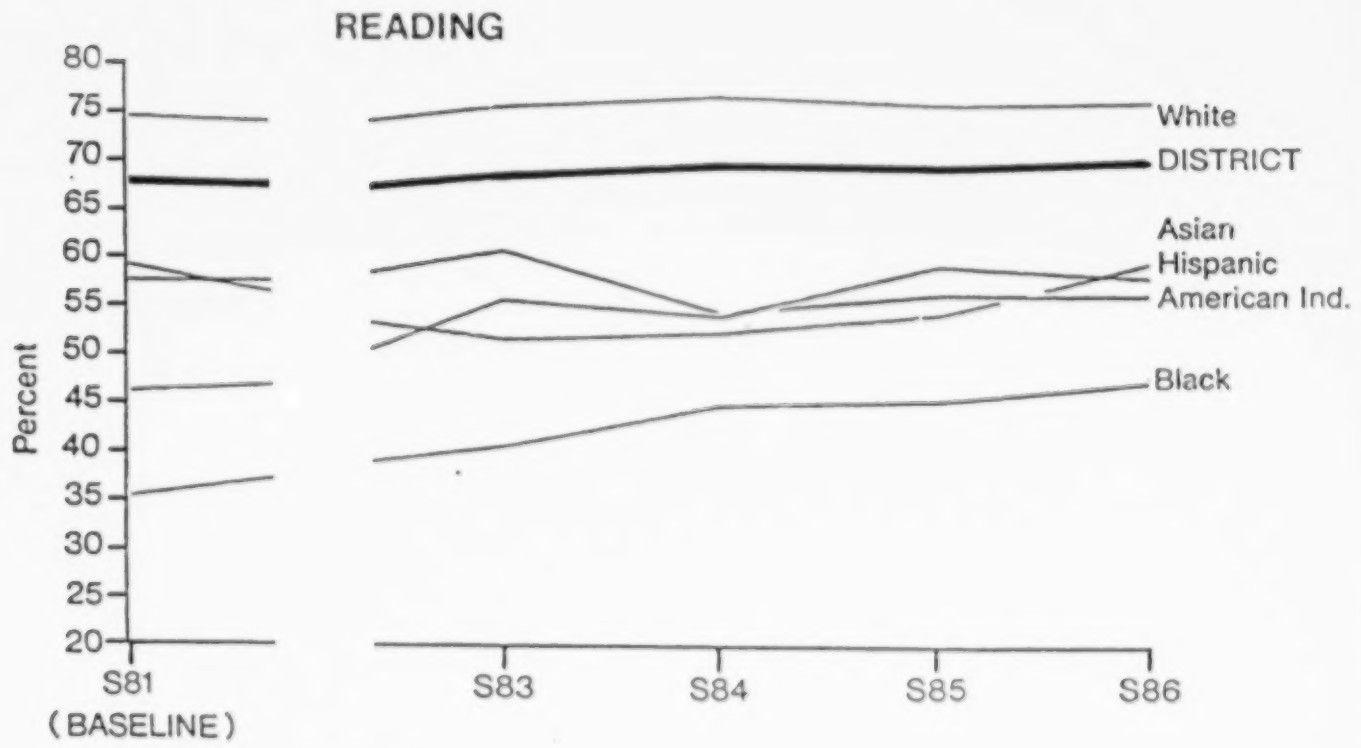
The report itself does not attempt to deal with the causes of the conditions it profiles. Instead, it presents an honest and accurate statistical portrait of culturally diverse children in the district on selected variables for which data are available by ethnic group. The problem identification and solution process is inspired and guided by the data in the profile. A summary of findings follows to convey the nature and the power of the data presented. This data is revealed in far greater detail in the district's profile report and is articulated further at program, building and classroom levels where it is used as an integral part of school and classroom improvement, evaluation and planning.

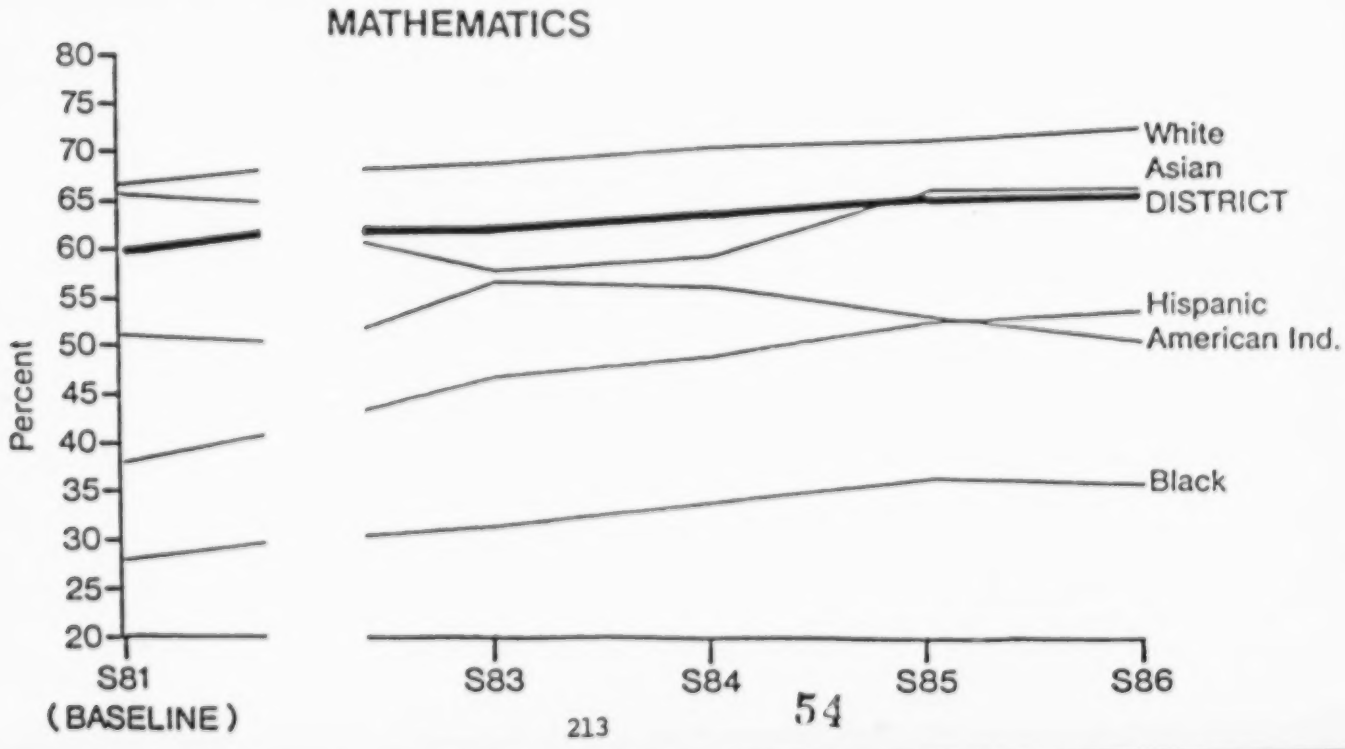
Student Achievement.

We looked at five student achievement indicators: test scores, school grades, absences, dropouts and suspensions. In general, results from the elementary Portland Achievement Levels Tests showed that White students had a higher level of achievement test scores than other ethnic groups in both reading and mathematics. Minority groups, particularly Blacks, showed lower levels of scores. Longitudinal data obtained from the 1980-81 through 1985-86 school years, however, provided some evidence that while the average levels of minority student scores were lower than the average levels of White student scores, the differences were generally becoming smaller over the years. Minority students have been making, in many cases, greater gains within a school year than White students. The result has been a convergence upon and in many cases surpassing of the national average as well as a trend toward closing of the "achievement gap" in many instances (see Figure 2).

FIGURE 2

GRAPHIC PRESENTATION OF THE PERCENT OF PORTLAND PUBLIC SCHOOLS ELEMENTARY STUDENTS ABOVE NATIONAL TEST PUBLISHERS NORMS.





Approximately 7.6 percent of high school seniors were ineligible to receive a standard high school diploma this year due to their inability to pass the district's basic skills Graduation Standards Tests (GST). This was up from 5.8 percent in 1984-85 and 6.0 percent in 1983-84. A generally disproportionate percentage of the students not passing the district's Graduation Standards Test have been minority students. This disproportion has been, however, declining. It has occurred primarily among those Asian students who were recent Southeast Asian refugees. In 1983-84, 52.3 percent of the students not passing the GST were Asian; in 1984-85, this dropped to 50.2 percent; and in 1985-86 the percentage dropped substantially to 35.5 percent. The percentage of Black students not passing the GST has also decreased over the past three years. In 1983-84, 22.8 percent were Black; in 1984-85, the percentage had dropped to 18.6; and 1985-86, 17.3 were Black. The number of Hispanic and of American Indian students not passing the Graduation Standards Test has been consistently low over the past three years.

Asian and White students received the highest percentage (34.0 and 25.2 respectively) of A's and the lowest percentage (5.2 and 10.2 respectively) of F's in their schoolwork. In proportion, Blacks received the smallest percentage of A's (13.3 percent) and American Indians had the largest percentage of F's (20.5 percent).

Asian students have the highest GPA and averaged a total GPA of 2.80 (A B-). White students had the second highest GPA and averaged 2.43 (A C+). Hispanic, American Indian, and Black students averaged a total GPA of about 2.0 (A C).

Asian students showed the smallest number of class absences, averaging 3.5 absences in the first class of the day during the second quarter of 1986-87. American Indians, Blacks and Hispanics had above average class absences during the same period of time. White students averaged 5.2 absences, the same as the district average.

There has been a general decrease in the rates in which students have dropped out of school in any one school year. Asian students showed the lowest dropout rate, averaging 5.1 percent for 1985-86. American Indians had higher dropout rates, averaging 13.0 percent for the same year. Dropout rates for White and Hispanic students were close to the district average of 7.3 percent. Black students' dropout rates were well below the district's, averaging 6.0 percent for the 1985-86 school year.

The percentage of high school graduates differed substantially among the ethnic groups. Hispanic, White, and Black seniors demonstrated higher than average rates of graduation (96, 90, 89 percent, respectively). American Indian and Asian seniors had a slightly lower than average rate of high school graduation.

Suspension rates have generally declined over the past several years for most ethnic groups. Black students, however, still showed a relatively high rate, averaging 5.9 percent for 1985-86 as compared with the district average of 3.7 percent. Asian students had the lowest rate, averaging only 1.2 percent for the same year. Hispanic and White students showed suspension rates lower than the district average. American Indian students' suspension rates were up during the 1985-86 school year, but numbers of American Indian students suspended are so small that percentages are generally not consistent from year to year.

Program Access.

In this analysis, we examined six program areas: talented and gifted programs, high school magnet programs, special education programs, ESL/bilingual programs, Chapter I programs and Project SEED.

Asian and White students showed the highest participation in TAG. Their rates, 8.5 and 8.1 percent respectively in 1986-87, were more than twice as high as those of other ethnic groups. American Indian, Black and Hispanic students had a participation rate of about 3 percent.

Black students have the highest participation in the magnet programs, averaging 11.2 percent in 1986-87. Hispanic students also showed an above average rate of 9.3 percent for that year. Participation rates of American Indian, White, and Asian students were slightly below the district average of 8.6 percent.

There was a slight increase in special education enrollment through 1984-85 and since then there has been a slight decline. In 1986-87, the percentages of American Indian (12.3 percent) and Black (12.8 percent) students receiving special education services were higher than those of the other ethnic groups. Asian students, on the other hand, had the lowest rate of participation, averaging 2.2

percent. Enrollment of White and Hispanic students was slightly below the district average of 8.5 percent.

For the 1986-87 school year, Black participation in Chapter I (22.6 percent for reading and 17.0 percent for math) was more than twice as high as the district averages of 10.1 and 6.7 percent. Participation rates for Asian, American Indian and Hispanic students were higher than the district average. White students had the smallest enrollment in Chapter I, averaging 7.0 percent for reading and 4.2 percent for math.

In proportion, more Black students were enrolled in Project SEED than any other ethnic group. Their participation rate of 7.3 percent for 1986-87 was more than four times as high as the district average of 1.6. Asian, White, and American Indian students had the lowest rate, averaging approximately 0.5 percent. Hispanic students were close to the district average at 1.7 percent.

Multicultural Curriculum.

The district appears to have made a concerted effort to strengthen its multicultural curriculum. The Curriculum Department has identified six major geocultural groups which have contributed to the American cultures. It has used this categorization to organize its multicultural curriculum. Each of the eight core curriculum areas has goals and objectives for teaching content that is multicultural with specific reference to the six major geocultural groups. The department has developed a cross-referenced grid linking existing planning documents, instructional materials, and key cultural concepts with the major ethnic groups.

In addition, the Educational Media Department, through the district's Professional Library, its Central Audiovisual Library, and individual school media centers, provides resources for both teachers and students in multicultural education. And the ESL/Bilingual program provides new student orientation, appreciation and support for home language and culture, and awareness of American's multicultural society; it has developed curriculum materials for students from diverse linguistic and cultural backgrounds.

Teaching Personnel.

At each individual school, the ethnic distribution of teachers

somewhat corresponds with that of its students. Schools with an above average percentage of one group of students often have an above average percentage of teachers of the same group. Looking at the district as a whole, however, one finds a consistent pattern of discrepancies. Except for White students, teacher percentages are generally less than one-half of the respective student percentages. There is a discernible pattern that teachers of groups other than Whites are under-represented in the teaching staff. The discrepancies between teacher and student ethnic distribution are most pronounced at the high school level. In addition, for the past two years nearly 90% of all newly hired teachers have been White in spite of intensified efforts to recruit minority candidates.

Policy Representation.

We have reviewed the ethnic composition of district central administration, school principals, Citizens Advisory Committees (CACs) and the Desegregation Monitoring Advisory Committee (DMAC). The data indicate that three groups (American Indian, Asian and Hispanic) were consistently under-represented in such policy groups. Blacks were over-represented in central administration and DMAC but under-represented in CACs.

In each area of review, the district has developed plans to improve the education of its culturally diverse children. For example, the district will expand the levels testing to include more subject areas (e.g., science and social studies) and grade levels. It will continue to review test items and testing procedures for potential bias and develop more sophisticated ways of analyzing data on student growth. In addition, the district is working on data systems which will allow for longitudinal tracking and analysis of student data on school grades, absences, dropouts and suspensions.

To improve program functions and outcomes, the district is reviewing and analyzing ways in which it has operated its special programs, including TAG, magnet, special education, ESL/bilingual, Chapter I, and Projects SEED and MESA.

The Curriculum Department has developed a series of plans to revise and expand its multicultural resources and materials as well as in-service training for teachers.

The Personnel Department is working to find ways of attracting

and retaining minority teachers.

The Superintendent is working with several community groups in an effort to encourage and support involvement of our culturally diverse citizens in school district affairs.

Syntheses

Table 1 presents the difference between the averages for each ethnic group and the district averages on the variables studied. For student achievement data, ethnic group averages are compared with averages for all students. For program access data, participation rates of each ethnic group are compared with the district participation rates.

Comparing ethnic group and district averages provides a picture of above district achievement, below district achievement, over-representation, and under-representation. In Table 1, a plus sign indicates that the ethnic group is higher than the district average; a minus sign indicates the group is below the district average.

TABLE 1
SUMMARY INFORMATION ON CULTURALLY DIVERSE STUDENT GROUPS
1986-87

Variable	American Indian	White	Black	Asian	Hispanic
8th Grade Reading:					
Level	-	+	-	-	-
Gain	+	-	+	+	+
8th Grade Math:					
Level	-	+	-	+	-
Gain	+	-	-	+	+
Passing Graduation Standards Tests	+	+	-	-	-
School Grades:					
A's	-	+	-	+	-
F's	+	-	+	-	+
Class Absences	+	-	+	-	+
Graduation Ratio	-	+	-	+	+

TABLE 1 (CONT.)
SUMMARY INFORMATION ON CULTURALLY DIVERSE STUDENT GROUPS
1986-87

Variable	American Indian	White	Black	Asian	Hispanic
Dropout Rates	+	+	+	-	+
Suspension Rates	+	-	+	-	-
Program Access:					
TAG	-	+	-	+	-
Magnet	-	-	+	-	+
Special Ed. (84-85)	+	-	+	-	-
Chapter I	+	-	+	+	+
SEED	+	-	+	-	-
Teaching Personnel:					
Elementary	-	+	-	-	-
Middle	-	+	-	-	-
High	-	+	-	-	-
Policy Representation:					
Administration	-	+	+	-	-
Principal	-	+	-	-	-
CAC	-	+	-	-	-
DMAC	-	-	+	-	-

Note: Only the most recent data are included in summary.

+ = Above district average
- = Below district average

As the district-wide synthesis in Table 1 indicates, there are still significant discrepancies in indicators of student performance among student ethnic groups in the Portland School District. Although, as noted earlier, some progress has been made in reducing lag in achievement test score level by greater gains by minority student groups, the most encouraging progress is indicated by other indicators such as reduced dropout and suspension rates. The key philosophical and procedural difference is that we are using such data at all appropriate levels throughout the system to plan, implement and monitor the success of efforts to reduce discrepancies. One key early benefit of this open data sharing has been an improvement in the climate of community relations.

Some of the major causes of this improved success of our students and our school system are the implementation of carefully screened and piloted specific programs and implementation of the general effective schools philosophy including:

- Improved classroom management aimed at helping students become more motivated and more responsible for their behavior and their learning. This results in fewer interruptions for teachers and students and more time on the task of learning.

- Clear and high goals for achievement in the basics and beyond. Our teachers know what they want students to learn and students understand what is expected of them.

- Well selected and appropriately challenging curriculum materials, instructional systems and learning tasks.

- Instruction designed to challenge every student to succeed and targeted on his or her current diagnosed learning needs. Such individualized and personalized instruction brings out the best in each learner.

- Effective and efficient special programs aimed at helping teachers meet the special needs of students.

- Partnerships with parents and with community groups in supporting student learning.

- Prompt, accurate and frequent feedback to students, parents,

teachers, support staff, program personnel, District managers, and policy makers on the success of their efforts at learning and at fostering learning.

- Systematic recognition, rewards and incentives for excellence in the level of achievement and progress in learning.

Conclusion

A variety of theories and hypotheses have been advanced to explain the observed differences in performance by various groups of students. Environmental theories held sway in the 1950's and 1960's, with an emphasis on family and school environments. These theories gave rise to the school desegregation and compensatory education movements. In the late sixties theories of cultural difference were developed. These paved the way for the multiethnic/multicultural movement of the 1970's and 1980's. A parallel development during the same period has been the emergence of the mastery learning and effective schools' movements with their emphasis on the ability of all students to succeed given clear and high expectations, emphasis on the basics, a safe and orderly learning environment, instructional leadership, and regular monitoring and reporting of student and program success. (Edmonds, 1979)

The fact remains that there are considerable differences in the observed average levels of academic achievement of students of different ethnic groups as early as first grade or even kindergarten. While research has established that much of the observed differences are correlated with socio-economic variables and while recent trends point to above average gains for previously low achieving student groups there is still much to be done to understand and deal with differences in student and system achievement and performance levels and with the subtle and complex educational and social issues that underlie them.

The steps being taken by Portland give hope of data based and measurement supported understanding and progress. We are developing and sharing with our staff, students and communities honest, accurate information on the performance of student groups and we are using that information to plan change and to monitor student and program success. As much as we would all like things to be perfect, as educational managers and as educators, we are

responsible for knowing what is the case, in working to make things as good as we can, and for knowing when, why and how we have succeeded and failed and then trying to do better next time.

The staff of the Portland Public Schools are proud that we have risen and are continuing to rise to the difficult challenge posed by student performance differences between student ethnic groups. In general our efforts have been well received by our community which welcomes accurate, timely and freely available information on how their children are doing and who value the new opportunities we are creating to work together to improve education for all students.

Footnote

1. In a recent report (June, 1987) Lyle Jones questions whether young black children in impoverished rural and urban areas are participating in the overall closing of the Reading NAEP Achievement Gap.

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THE ROLE OF TESTING AND EVALUATION

The Need to Assess Multiple Crucial Components in Evaluating Programs

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My goal in this brief paper will be to provide several illustrations of the importance of attending to multiple crucial components of effective programs and determining how they may fit together to improve instruction for disadvantaged minority students. Such attention is critical in the identification, design, implementation, and evaluation of effective programs.

One useful recent example of the general problems that arise in identifying and assessing crucial components has been provided in a "best-evidence" analysis of mastery learning research carried out by Bob Slavin of Jon Hopkins University. Zeroing in on technically-competent studies that compared mastery learning with traditional instructional sequences, Bob concluded that mastery learning generally has not produced large, generalizable achievement gains in controlled experimental implementations.

This important finding points (in my mind) to the likelihood that mastery learning along will not help low achieving students in poverty schools or elsewhere unless it is implemented in conjunction with other key changes such as effective curriculum alignment and reorganization, if necessary, in grouping arrangements. In my experience, some schools that have attended to such imperatives as part of a unified approach to improvement have been successful in substantially raising student achievement through mastery learning. In short, mastery learning may be a crucial component in some successful efforts to improve achievement, but it alone is not sufficient to assure program effectiveness. Rather, a multiplicity of crucial components is required.

Rather than negating the potential utility of mastery learning, Bob's results can be viewed as helping to call attention to the concomitant changes that must be made if mastery learning is to be a useful component in a school improvement project. Unfortunately,

his results likely will be used by some readers to support the conclusion that mastery learning cannot be helpful in improving the achievement of disadvantaged students.

One useful way to articulate the larger issue of multiple crucial components is to pose and try to answer a few questions as follow:

Q: If mastery learning or any single treatment by itself, does not improve students' achievement, does not mean it is not potentially potent in helping to improve achievement?

A: No. Successful mastery learning at poverty schools requires, among other things, implementation in conjunction with unusually effective organizational arrangements for low achievers. (One possibility involves very small classes for students functioning very poorly.) In addition, by definition mastery learning requires more time to provide corrective instruction for low achievers. If mastery learning when properly implemented in conjunction with appropriate changes in organization and scheduling of instruction yields large achievement gains, then mastery learning can be an important approach for improving achievement. An exact analogy would be a medical treatment in which exercise and medication together, but neither separately, reduced subsequent incidence of heart attacks.

Q: What then can we learn about the effects of potentially important instructional changes when we vary conditions in order to test them in isolation?

A: Only whether they are effective in isolation, not whether they can be combined with other changes to produce improvement. Since instruction takes place in the complex setting of schools and classrooms, few if any innovations are likely to produce sustained and substantial improvement unless part of a larger effort to impact the larger setting. It is well established, for example, that substantial staff development, together with motivation to participate in it, is a prerequisite for successfully implementing a serious innovation. Given this interdependence, one should not reject an innovation after assessing its effects in settings with inadequate staff development or insufficient incentives and support.

Q: Is mastery learning the only instructional sequence available for improving the achievement of disadvantaged students? Is there a single best approach?

A: Obviously not. In fact, most of the unusually successful poverty schools I have seen or learned about have not used mastery learning as defined by James Block, Benjamin Bloom, S. Alan Cohen, Thomas Guskey, or other leaders in this field. In addition, I have not been able to find inner city senior high schools (or hardly any other high schools, for that matter) which have introduced mastery learning successfully on a school-wide basis. On the other hand, successful inner city schools of necessity do use some approach to "mastery-type" learning, i.e. their faculty go to whatever lengths are necessary to make sure that nearly all their students make progress in mastering agreed-upon learning objectives. Within this context, when mastery learning as defined by Bloom and others is implemented well, it does offer some particular advantages in terms of focusing instruction more effectively on the learning problems of initial low achievers.

A related problem occurs in situations in which the set of changes or variables one is assessing through research does not include those that actually were most important in bringing about improvement. One example of this occurred in the series of sub-studies which researchers at the old U.S. Office of Education conducted using data from the EEO study directed by James Coleman. Because the questionnaire administered at schools participating in the study did not include good items dealing with the leadership of the principal, there was no possibility that this variable could show up well in the sub-study that contrasted unusually effective and ineffective schools.

Another possible example along these lines may be present in some of the publications prepared by personnel in the San Diego Unified School District. San Diego has carried out probably the most successful program in the United States for improving the performance of students attending concentrated poverty schools -- the Achievement Goals Program (AGP). The descriptions I have seen of the AGP unusually cite four main components: increased time on task; direct instruction; improved classroom management; and mastery learning.

However, there are reasons to believe that an equally or even more important intervention involved a radical curriculum change which removed basal readers from classrooms so that teachers no longer could proceed page-by-page at the pace of the slowest student. (This intervention is only hinted at in some descriptions of the four components.) If this intervention indeed was critical, as there is reason to believe it was implementation of an AGP-like program elsewhere in the absence of radical curriculum alignment could result in non-transportability along with severe disappointment and discrediting of the four useful components identified as part of the program.

Among the implications of the preceding discussion are that program evaluation generally requires some attention to implementation analysis, whether formally labelled in this way or not, and that evaluators should have substantial knowledge of and familiarity with the schools at which they assess programs.

On the first point, it is apparent that evaluators must understand what schools actually are doing to implement program components and to overcome obstacles to effective implementation, if components crucial to success are to be identified for the analysis.

Regarding the need for evaluators to acquire in-depth knowledge of how programs actually are being implemented and the actions teachers and administrators must take to assure their success, evaluators can spend time in classrooms themselves or obtain the opinions and perceptions of others familiar with participating schools, or combine these two approaches.

Of course, spending time in schools and obtaining information from knowledgeable observes do not guarantee that crucial components will be clearly identified, but failure to engage in these aspects of data collection will multiply the likelihood that program assessments will omit key considerations which ultimately determine success or failure among initial participants and subsequently at sites engaged in replicating promising innovations.

THE ROLE OF TESTING AND EVALUATION

Some Thoughts on How Testing and Evaluation Can Improve Educational Opportunities for Underachieving Minorities

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A twenty minute presentation is not very long, yet the opportunity to address such a diverse and august group of educators prompts me to focus my time on some thoughts which I hope will make you somewhat uncomfortable, in some cases for their speculativeness and in other instances for their departure from the current zeitgeist. I will address both testing and evaluation, or rather, some new departures in both fields which I believe are definable in the light of what is needed, or what has not yet been accomplished.

Evaluation

I am gratified that the number of journals on evaluation has increased but concerned that the number of journal articles dealing with urban, minority, and compensatory education has not. A cynic, I suppose, could begin by asking, "Given that much of the financial impetus for the development of program evaluation as a field came from compensatory education and other government programs (Daniels & O'Neil, 1979), what has evaluation done to improve the lot of the underserved, the ill-served, non-dominant groups in American society?" One of CRESST's guiding premises is the belief that testing and evaluation are important tools for promoting educational equity. Perhaps this conference is a partial repayment.

But to move ahead, I believe it is necessary for us to distinguish between a moderately routinized, operational program evaluation and one which seeks to influence policy at levels which could affect a significant sector of educational practice, not just a parochial interest.

We need also to recognize that certain programs are likely to generate confusion and ill will when they deal with an already politically sensitive area (e.g., bilingual education), require extensive systemic change (e.g., Experimental Schools Program) (Lenning,

1977), or combine one or both of these elements with personal pride or finances (as in the case of Career Ladders). It is wise to note that for some proponents and opponents of controversial programs such as these, no amount of data or evidence will dissuade them. What we should attempt is to gain a balanced picture when analyzing large-scale, controversial programs. One could, for example, let out three small contracts instead of one large one. One proponent group and one contrary group would be in charge of analyzing the data which yet a third, ostensibly more neutral, group would collect to satisfy the analysts' designs. Comparing the results (reported in a uniform, juxtaposed format) might help us all to evaluate how well evaluation can handle controversy (see Duckett et al., 1982) and see just how Suchman's old (1967) pitfalls of evaluation ("eyewash," "whitewash," "submarine,", etc.) apply today.

It is a testimony to our lack of imagination that comp-ed programs look so compensatory. (Like Levin, I feel that comp-ed should be an enriching, alternative mode of delivery.) And it is a similar problem for us to continue to look at national norms and "regular progress" as the touchstones for many minority programs. We need to think of how educationally disadvantaged minority children would do if they were placed in the regular program, which after all does not want them (Bernal, 1984). (Why else were special programs created?) I am not sure how best to estimate these effects, but I am certain that this would be a more revealing comparison, both pedagogically and politically.

Since minority students are culturally (i.e., behaviorally) different, it is crucial that policy-and-program-evaluations deal with naturalistic settings (Wardrop, 1971), particularly the way the schools (representing the majority culture, values, and expectations) interact through their rules and representatives with the minority cultures, children, parents, and neighborhoods. I recall an old ethnographic study by Spradley (1971), never picked up in the education literature, which found that minority school children, rather that being "culturally deprived" were often culturally overwhelmed, and concluded that to succeed in school minority students needed to possess a capacity not required of others, namely to become bicultural. This study illustrates how perceptions and protocol are critical intervening variables. Real events, not just official events, in terms of human transactions, must be documented (Charters & Jones, 1973).

In a similar vein, we need to stop fragmenting educational objectives without attempting a synthesis which transcends individual objectives (see Page & Stake, 1979). Many programs present an evaluator with goals and objectives which later experience proves to be excessive, undesirable, or positively misleading -- B.S., in short. I believe that controversial, complex programs are not only not evaluatable in their first year, but also that the task of the evaluator of these programs is to complete the evaluation design after the project is underway, and that the first year or two of the evaluation should be as fluid and formatively dynamic as the project itself (see Weiss, 1973).

Nor need we be naive to think that the goals and objectives provided us are the only ones we should measure. I suppose I am arguing against the disinterested evaluator role whenever policy issues are being investigated. The evaluator in a collaborative role, however, needs to have the courage to supply essential goals and to examine the data to see if they have been fulfilled. Among these are the long-term monitoring of achievement, placement, and retention of minority students to see if they have similar options for being tracked within the curriculum as White students do, over the long run. (See Oakes, 1987, for "indicators of equity.")

While systems exist for objectively discovering which goals are real and for prioritizing the maze of objectives which complex programs present us (e.g. Borich, ca. 1984), what is needed, additionally, is a good model for detecting how objectives interact with one another, particularly how implementation of certain program features -- how the attainment of certain objectives -- might impede or facilitate the realization of other objectives. For example, the early reclassification and exit of limited-English-proficient (LEP) students from bilingual programs may impede their long term success in school and necessitate further special services, such as Chapter I programs. (Such "exits" from transitional bilingual education to another compensatory program instead of to regular education are a sham, in my opinion.) The possibility that objectives interact with each other means that a project's effects and impacts may be greater or less than the sum total of its individual objectives.

Testing

My first and most basic recommendation for psychometricians is to move directly to de-bias tests of intelligence, aptitude, and

achievement, even if you do not believe them to be biased! This effort would in any case be a more creative and engaging enterprise than defending current practices. New goal: to measure adequately as well as validly without compromising other features of a test like reliability and usability.

I suppose that I see recent developments in the bias issue as portending even greater conflict, more serious confrontations. On the one hand, such programs as "teacher-competency" and student-achievement (basic skills) testing, are expanding and generating new hundreds of thousands of dollars to certain test-making and test-scoring enterprises yearly. On the other side of the political equation, groups that oppose testing in one or more of its forms are joining forces with consumer advocates and even with avowedly political action organizations. The underlying social issue, however, has to do with the real costs of these conflicts in terms of human potential lost, not to mention the professional energies which will be dissipated in formal judicial hearings and legislative manipulations.

> Mercer (1979) has stated that psychologists generally are among the established American elites (in the sociological sense) and that they understandably perpetuate a psychometric belief system which provides a "scientific rationale for the continued ascendancy of politically dominant racial and cultural groups" (p. 112). She further points out that there are a few psychologists who hold a counterideology, one which rejects "a definition of 'intelligence' which is based entirely on an individual's knowledge of the Anglo core-culture and would include the language, skills, and knowledge needed to operate successfully in non-Anglo cultural settings" (Mercer, 1979, p. 112). I wish to add that while many apologists for extant testing practices claim that measured mean differences between Whites and minorities are functions of differential educational opportunities, the testing industry has never really studied this particular question, a crucial hypothesis, really, which can only be answered by investigating several alternative possibilities at the same time.

The new tests which I envision might include a representative sampling of thinking, learning, and expressive styles and bicultural survival competencies (so that almost everyone does poorly on a few sections of the test, but not on the same ones). These tests should not be like the old "culture free" tests, with all their attendant

problems, including lack of validity, but should address themselves to a wide variety of abilities (see Flaugher, 1971) that new research would show are important to success in life generally and in school as well. We must keep in mind that current predictor variables are not all that powerful (which occasionally gets tests into trouble even with White populations); hence a search for stronger and "alternative" cognitive skills and "nonintellective" (Lenning et al., 1974) factors is in order -- predictors we do not yet tap. We could, for example, develop tests based on studies of extreme groups who do not perform as our contingency tables would predict, then compare these groups to each other and to groups of more consonant individuals. The application of computer-assisted testing may also be in order here, for the sake of both efficiency and humaneness, to reduce overall testing time and stress on such diverse sets of items.

While tests allow us to do some very sophisticated analyses of individuals and groups, we have to adopt a more user-and consumer-friendly approach:

1. We need tests of achievement/placement which yield not only reliable but also accurate scores without having first to subject minority kids to extensive test-taking skills training. In short, we need tests which are not so artificially constructed that they mask the true abilities and achievements of minority students. (See Bernal, 1986.)

2. We need tests of ability/diagnosis which yield educationally and clinically meaningful profiles.

3. We need tests which prognostiate success or failure in the long run, not just the short run, so that we might better counsel both minority and majority students and prepare more appropriate interventions for those who may encounter only short-run difficulties.

Finally and very importantly, we need to stop testing for the prestige of it or to gain political approbation from the public. Teacher competency testing, where a test score effectively becomes either the sole criterion or part of a multiple cutoff system of screening for admission to teacher education or for certification, is an issue in point. The Pre-professional Skills Test (PPST) and the California Basic Educational Skills Test (CBEST) admittedly have little to do with actual professional outcomes such as classroom

effectiveness. Glass (1986), who concludes that very few people ultimately fail these tests (given that some must retake the examinations), misses an important point: Minorities fail these tests in disproportionately high rates and are not particularly successful on subsequent attempts, as the PPST data from Arizona indicate (Cropper & Nomura, 1987). When we use tests to satisfy political agendas, tests which have little or no relationship to professional competencies, but which severely and disproportionately impact minorites, one must suspect that hidden political agendas may include the limitation of opportunities for minorities to enter the teaching profession while reassuring the public that educational reform -- and insistence on standards -- is taking place.

Conclusion

Compensatory education has enjoyed some successes but perhaps not as many as it might have achieved had it embarked on a different course by offering a program more appropriately tailored to the needs of non-dominant ethnic schoolchildren. In too many cases, compensatory education has merely presented a slower, less interesting, less challenging version of regular education to these youngsters (see Bernal, 1984). My own impression is that the results of these programs are ideologically disappointing although, realistically speaking, quite good, given how little innovation was invested in their design.

Evaluation can make a real difference in the configuration and delivery of programs for underachieving minorities if it begins to document what is really going on, how these events are perceived by different actors, and how these perceptions compare. My experience convinces me that to a very great extent parents, children, administrators, and teachers do not perceive the same educational events in the same way, and that they might accomplish a lot more if they knew what each of the others was thinking. I suppose that I am arguing for more observation, more ethnographic monitoring, because I have encountered so many dissonant perceptions in my own studies. But because these require significant outlays of money, they may have to be reserved for major evaluative undertakings. What must be done in all cases, however, is to link these goings-on (programmatic features, events, variations) to student achievement, attendance, retention, and placement/tracking over long periods of time, since these criteria are closer to what educational equity is all about.

For the testing profession to make a contribution to minority education may require a major reorientation of both individuals and organizations, from defensive (albeit "scientific") posturing to creative problem-seeking and problem-solving. It would be far more socially beneficial and professionally challenging to discover the psychological sources of differential ethnic performance on both predictive and criterial measures than to continue to invest resources in the defense of traditional tests.

If such research proves fruitful, if it were possible to sift the "real" differences from the culturally/arbitrarily imposed biases/problems in the instruments, then new tests could be devised which would alter not the psychometrician's social role as gatekeeper (elite) but the demographic characteristics of the persons who would be most significantly affected by testing.

By ensuring that both our instruments and the criteria by which we judge their validity are unbiased, we could simultaneously assure ourselves, the public, and the school professionals whose programs we evaluate that our tests are not merely consequential but also germane. At a time when we spend such great efforts justifying current practice in test design and validation (Bernal, 1986) to no one's deep satisfaction (except for true believers), is this not the time to try?

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THE ROLE OF TESTING AND EVALUATION

Results from Using The WICAT Learning Solution for Underachieving Minority Students

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Introduction

This paper describes some very promising results from using the WICAT Learning Solution (LS) to produce significant learning gains for minority students. The Learning Solution involves the integrated use of the following:

- a computerized school learning center,
- comprehensive courseware curricula,
- sophisticated learner management,
- advanced assessment and testing programs,
- hardware solutions designed for schools,
- on-going training and support, and
- complete maintenance service.

The Learning Solution is currently implemented in approximately 350 locations nationwide. Representative school districts include: Garland District, TX; Pharr-San Juan-Alamo District, TX; Stillwater, OK; New York City, NY; Chicago, IL; Prince Georges County, MD; Broward County, FL; Indian River County, FL; Asuza District, CA; Hueneme District, CA; Oxnard District, CA; and Santa Barbara, CA. Each of the 350 school implementation sites has a minimum of 32 student learning stations (350 sites x 32 learning stations = 11,200 learning stations) which are used throughout the school day to provide comprehensive, computerized curriculum, testing, and instructional management capabilities. Several districts (Garland, TX; Pharr-San Juan-Alamo, TX, Indian River County, FL; Hueneme District, CA and Asuza District, CA) have implemented the Learning Solution in each school in the district.

Learning Solution Description

The Learning Solution consists of the integration of a computerized school learning center, comprehensive courseware curricula, sophisticated learner management, advanced assessment and testing programs, hardware solutions designed for schools, on-going training and support, and completes maintenance services. The following sections describe the major features and capabilities of each of these integrated aspects of the Learning Solution.

The School Learning Center. The Learning Solution is implemented in a school using a Learning Center configuration. The Learning Center includes minicomputer with a large hard disk storage capability which can support up to 32 student learning stations (standard school learning center) or up to 64 student learning stations (large school learning center). Alternative Learning Center configurations can provide individualized computerized instruction and assessment for up to 350 students daily (standard school learning center) or up to 700 students daily (large school learning center).

The Learning Center provides lessons which are tailored to the individual learner. Each lesson is automatically tailored to meet the needs of individual students. Interactive exercises encourage students to develop higher order thinking skills. Drill and practice lessons are also included. Teachers receive up-to-the minute student management reports which permit them to monitor student performance and progress and identify areas where students require individualized attention.

The Learning Center allows each student to work on different courseware lessons all at the same time in the same lab. The system is also easy for teachers and students to learn and operate. Each student can take computerized achievement tests in the Learning Center and receive appropriate prescriptions to WICAT's comprehensive curriculum. Student responses to the courseware and testing materials are monitored and teachers receive reports on individual performance as students proceed through the materials at their own pace.

The Learning Center courseware uses an extensive graphics library to stimulate student interest and motivate students toward higher performance. Students see learning situations that are acted

out in vivid animation. All system configurations include high-quality, life-like audio capabilities which are educationally invaluable for beginning reading instruction, activity directions, language instruction, and feedback or reinforcement.

Courseware Features

The Learning Solution provides comprehensive K-12 grade courseware curricula for students in reading, mathematics, language arts, and speciality subjects. Currently, WICAT provides 15 year-long courseware curricula packages. These include:

Mathematics: K-6 Mathematics, Middle School Math, Algebra I, Algebra II, and Geometry;
Reading: Primary Reading, Reading Comprehension;
Language Arts: Language Arts, Secondary Language Arts, and Writing;
Speciality Subjects: Computer Literacy, English as a Second Language, French, Chemistry, and

High School Basis Skills: Reading, Math, and English. This represents a total of approximately 2500 hours of computerized instruction. The comprehensive courseware has been developed to correlate to major state assessment objectives as well as to focus on teaching higher order thinking skills as well as basic skills. Yearly enhancements are made, as needed, for each courseware package. Brief examples are provided below of some of the typical courseware features.

The WICAT Primary Reading Curriculum complements and enhances classroom instruction in beginning reading skills for students in kindergarten through grade 3. Through the use of voice-quality audio and powerful graphics, the curriculum teaches the following sample primary reading skills: letter identification and discrimination, initial consonant sounds, sight word identification, sound patterns, picture sentences, paragraph comprehension, word identification through context, and identifying word meanings in context. The curriculum is easy for students to use since most of the exercises require the use of only five basic keys. Several forms of Prompts and Helps are available to students. The Primary Reading curriculum consists of a total of 1010 interactive activities organized into 285 lessons.

The WICAT Reading Comprehension curriculum is appropriate for students grades 4-8 and includes 565 separate lessons, presented as newspapers articles or stories. The newspaper editions available to the student include a mix of stories on the student's reading grade level, one year above reading level, and one year below reading level. From the newspaper edition list presented, the student selects a newspaper edition to work on and one of five newsstory articles available in the edition. The student must respond correctly to 80 percent of the questions on three stories within one reading level before advancing to the next level. Various Prompts and Helps are available to students during the reading exercises. This unique curriculum teaches critical thinking skills and shows students how to apply these skills in a logical process to understand printed material.

The curriculum teaches students to draw inferences and conclusions, and to make predictions from text; to provide justification for conclusions, inference predictions; to judge the validity of an argument based on stated criteria and evidence; determine the relations of parts of a passage to its total meaning; to interprete data presented in graph, chart, or tabular form; and to identify appropriate summaries of text passages.

The WICAT Middle School Math Curriculum is designed as an effective supplement to the standard mathematics curriculum for grades 5 through 8. The curriculum uses a variety of methods to teach mathematics concepts, to reinforce skills and to stimulate student interest. The Middle School Math Curriculum consists of 130 lessons organized into the following five major strands:

Numbers (whole numbers, fractions, mixed numbers, decimals, and integers),
Operations (addition, subtraction, multiplication, division, powers, square roots, and absolute value),
Geometry (identification, classification, and comparison of geometric figures
Algebra (algebraic variables and expressions, linear equations, inequalities, and graphs and functions), and
Probability and Statistics (descriptive statistics, probability, permutations and combinations). The curriculum consists of 130 lessons organized into four grade levels 5 through 8.

In the Middle School Math Curriculum, concept development activities provide graphic models to promote mental images of

concepts and insight into the relationships between concepts and symbolic math skills. Practice activities with consistent feedback reinforce the math skills. Helps provide additional support for students who need it without intruding on students who do not. Drill activities encourage immediate recall of facts. Problem solving activities promote productive problem solving habits and challenge students to thoughtfully apply previously learned math concepts in real-life contexts. Rich, animated graphics demonstrate math concepts and principles along with prompts and questions that guide the student through an interactive, discovery approach to learning mathematics.

Learner Management Features

As each student progresses through the curriculum, teachers can request several standard management reports which include information on individual student and class progress. These management reports indicate the lesson difficulty for each student and class, time on task for the student and class, the number of trials each student required for mastering the activity, the number of activities attempted, and number mastered for each student and class, and the student's relative class standing. The learner management system provides teachers with considerable flexibility in managing individual and class group courseware placement, assigning and sequencing activities for students and class groups, and in determining the frequency and the types of management reports desired. Management reports can be generated for either individual students or class groups for an individual courseware activity, multiple activities, or the remaining activities in each student assignment list. The learner management capabilities also allow districts to correlate their own district objectives with WICAT courseware objectives. Teachers can also restructure the courseware curriculum for students and classes to better parallel the classroom instructional sequence.

Advanced Assessment and Testing Features

The Learning Solution includes the integration of advanced, computerized assessment and testing capabilities for schools. WICAT has developed computerized predictive assessment tests based on a national list of assessment objectives and specific state predictive assessment tests for the states of Texas and Florida. Additional state predictive assessment tests will be developed in the future for other states. These predictive assessment tests can be administered at the school's choice any time during the school year. The test results indicate which state assessment objectives each student or group of students has mastered and which objectives are not yet mastered. For objectives which are not mastered, the computerized assessment system also provides prescriptions to appropriate textbook pages and to courseware lessons. These prescriptions are used by the teacher to more effectively help the student or group of students master the state mandated objectives. When students start using a courseware package the computerized testing capabilities can help determine their skills in the subject and provide appropriate placement in the courseware lessons.

In the use of these computerized testing programs, WICAT has found the following advantages of computerized testing over standard paper and pencil testing:

- standardized administration conditions
- ease of administration and management
- individualized test administration
- immediate scoring and reporting
- non-biased scoring
- enhanced presentation capabilities (text, graphics, and audio)
- enhanced response capabilities (multiple choice, free response, performance)
- increased testing efficiency, and
- improved test security

WICAT has also been a pioneer in the development of computerized adaptive or tailored tests of school achievement and ability. With a computerized adaptive test the student receives an initial item of average difficulty. If the student answers the item correctly, a more difficult item is presented. If the students answers the item incorrectly, a less difficult item is presented. The testing

process continues to adapt to the individual responses of the student. After each item a new estimate of the student's ability or proficiency in the subject area is estimated. The testing process continues until a specified level of precision or standard error is reached and the testing is terminated. Research results have shown that computerized adaptive testing can significantly reduce the amount of testing time and number of items required in a test by 50 to 75% with an equal or greater level of precision of measurement. In their work with computerized adaptive tests, WICAT has found the following advantages of computerized adaptive testing over standard paper and pencil testing:

- Provides more precise measurement with fewer test items than conventional tests
- reduces testing time by 50% to 70%
- tests are adapted or tailored to each individual student's responses
- uses current procedures and applications of item response theory
- provides equally precise measurement at all ability levels
- carefully selects test items to match student ability levels
- reduces frustration for low ability students and reduces boredom for high ability student.

The Learning Solution also provides the schools with the capability to create their own computer-administered or computerized adaptive tests of school achievement and aptitude. Districts use comprehensive banks of objectives and items to select the specific objectives required for testing, to select the test items (text, graphics, and audio), to locally generate the computerized tests, to administer the tests and to generate individual and group reports on the customized, computerized tests. Districts can also contract for the preparation of customized objective and item banking services which includes computerized banks of the district's own objectives and test items.

Training and Support Features

The Learning Solution provides on going training and support for each of the Learning Center installation sites. An Account Manager and a Technical Education Specialist work directly with each

installation site to meet the specific site needs for system information, proposals, purchasing, installation, implementation, training and support. Under the direction of the Account Manager, the Technical Education Specialist provides school administrator training, learning center manager training and teacher training during a three to five day period at the beginning of system installation. The training includes information on the Learning Center capabilities and features, scheduling and implementation issues student behavior management, curriculum overviews, recommendations for implementing curricula, hands-on experience with the curricula being implemented, interpreting and using the management system reports for curriculum and testing, and recommendations for integrating learning center activities with classroom activities. Follow-up training and continued classroom integration training is provided for each learning center site during a two-three day period a few months following system installation. The Account Manager and the Technical Education Specialist also provide on-going training and support as requested by the learning center site.

Learning System Maintenance Features

The Learning Solution includes comprehensive hardware, system software, courseware, and testware maintenance. WICAT provides a nationwide network of customer service maintenance technicians in addition to a 24 hour toll-free, hotline support for hardware, software, courseware, and testware maintenance. The customer service maintenance technicians provide preventive as well as on-going system maintenance for each learning center installation site. WICAT provides comprehensive, full-service maintenance agreements for all Learning Center sites. Learning Center managers are requested to call the toll-free, hotline number if any problem is encountered in the system hardware, system software, courseware, or testware. When a maintenance call is received it is immediately dispatched to the appropriate customer service maintenance technician for resolution. WICAT's central maintenance dispatch service can provide current information on the status of any site maintenance request for hardware, software, courseware, or testware. WICAT also maintains a current staff for problem resolution and enhancement for any of the courseware or testware products. In addition, the Technical Education Specialists work directly with the learning center managers to provide training and

support for new system software, courseware, and testware products.

Hardware Solutions Designed for Schools

The Learning Solution provides hardware options and solutions which are designed for schools. The Learning Center systems can meet the needs of small to moderate sized schools with the standard learning center configuration with 32 learning stations for a school with up to 350 students. The large school learning center configuration includes up to 64 learning stations for a school with up to 700 students. The smallest of the learning center configuration includes either 8 or 16 terminals and can meet the needs for schools or special education programs with up to 175 students. The modular configurations of the learning center system configurations provide for continued expansion of the learning system as the school needs change. The Learning Center provides schools with high fidelity audio, sophisticated graphics, and animation capabilities. Schools can also link popular microcomputers (Apples and IBM PC's and compatibles) as alternative learning center stations. Current capabilities also allow for centralized management of learning stations which are located in multiple classroom locations.

EVALUATING THE WICAT LEARNING SOLUTION FOR MINORITY STUDENTS

The Learning Solution has been installed in several minority school districts for a period of 1-4 years. Several of these districts have conducted district evaluations of the outcomes from the Learning Solution. Most of the available evaluations have been conducted using a pretest-posttest evaluation design. WICAT is currently developing a comprehensive evaluation plan which will employ experimental and control groups within six districts to evaluate the outcomes from implementing the Learning Solution (Olsen, 1987).

The following section presents results from district-conducted evaluations of the Learning Solution for minority students. Additional information will be available over the next several years as WICAT continutes their comprehensive evaluation studies.

ACHIEVEMENT RESULTS FROM USING THE WICAT LEARNING SOLUTION

Pharr-San Juan-Alamo District, TX

The Pharr-San Juan-Alamo, TX school district has implemented the Learning Solution district-wide at seventeen school sites during the 1986-1987 school year. The Pharr-San Juan-Alamo Independent School District is located in the Rio Grande Valley of Texas. The student population is about 90% Hispanic. Approximately 40% of the school population had Limited English Proficiency at the beginning of the evaluation period. Each of the seventeen sites installed a Learning Center with 32 learning stations along with the courseware for Primary Reading and Reading Comprehension. Evaluations were conducted with between 1300 to 1400 students at each grade level 3 and 5.

The WICAT computerized predictive state assessment test was administered in October 1986 to all district third and fifth grade students. Individual and group reports showing mastery or non-mastery of state assessment objectives were provided to teachers. Teachers also received prescriptions to courseware lessons and textbook pages for non-mastered objectives. Teachers implemented the appropriate classroom and Learning Center prescriptions. The WICAT computerized predictive state assessment test was readministered in January, 1987. Teachers again implemented the appropriate remedial prescriptions. The Texas state assessment test was administered in February, 1987.

An evaluation of the Learning Solution was conducted using the Texas Educational Assessment of Minimum Skills, the Texas state assessment test, administered in February, 1986 and February, 1987. The February 1986 results are prior to implementing the Learning Solution; the February 1987 results are after implementing the Learning Solution. Table 1 presents the learning outcome results comparing the percent of students passing the state assessment test at the district and state levels. The districtwide achievement gains (18% to 40% gains) are several times greater than the comparable state achievement gains (0% to 8% gains). In 1986 the district results were either at or significantly below the state average; in 1987 the district results were significantly greater than the state averages. Table 2 presents results for the district and state for the Limited

English Proficiency students. The district Limited English Proficiency achievement gains (23% to 47%) are significantly greater than the comparable state achievement gains (2% to 16%). These results show that the Learning Solution was very effective for districtwide minority students and for Limited English Proficiency minority students.

TABLE 1
EDUCATIONAL OUTCOME RESULTS
PERFORMANCE ON THE TEXAS STATE ASSESSMENT TEST
PHARR-SAN JUAN-ALAMO INDEPENDENT SCHOOL DISTRICT
SPRING 1986 - SPRING 1987

SUBJECT	GRADE	DISTRICT RESULTS	STATE RESULTS
READING	3	55% passing (1986)	74% passing (1986)
		75% passing (1987)	79% passing (1987)
		20% Gain	5% Gain
	5	57% passing (1986)	83% passing (1986)
		84% passing (1987)	83% passing (1987)
		27% Gain	0% Gain
MATH	3	72% passing (1986)	80% passing (1986)
		90% passing (1987)	86% passing (1987)
		18% Gain	6% Gain
	5	62% passing (1986)	80% passing (1986)
		89% passing (1987)	86% passing (1987)
		27% Gain	6% Gain
WRITING	3	49% passing (1986)	50% passing (1986)
		71% passing (1987)	63% passing (1987)
		22% Gain	13% Gain
	5	41% passing (1986)	64% passing (1986)
		83% passing (1987)	68% passing (1987)
		42% Gain	4% Gain

TABLE 2
LIMITED ENGLISH PROFICIENCY STUDENTS
PERFORMANCE ON THE TEXAS STATE ASSESSMENT TEST
PHARR-SAN JUAN-ALAMO INDEPENDENT SCHOOL DISTRICT
SPRING 1986 - SPRING 1987

SUBJECT	GRADE	DISTRICT RESULTS	STATE RESULTS
READING			
	3	29% passing (1986)	30% passing (1986)
		56% passing (1987)	42% passing (1987)
		27% Gain	12% Gain
	5	27% passing (1986)	40% passing (1986)
		64% passing (1987)	46% passing (1987)
		37% Gain	6% Gain
MATH	3	59% passing (1986)	55% passing (1986)
		83% passing (1987)	71% passing (1987)
		34% Gain	14% Gain
	5	37% passing (1986)	51% passing (1986)
		76% passing (1987)	65% passing (1987)
		39% Gain	14% Gain
WRITING	3	27% passing (1986)	26% passing (1986)
		50% passing (1987)	40% passing (1987)
		23% Gain	14% Gain
	5	17% passing (1986)	29% passing (1986)
		64% passing (1987)	31% passing (1987)
		47% Gain	2% Gain

San Jacinto Elementary School,
Goose Creek Independent School District, TX

The Learning Solution was installed at the San Jacinto Elementary School, Goose Creek Independent School District, TX. The San Jacinto Elementary School is a Chapter I school. The school population is 89% minority, predominantly Hispanic. A Learning Center with 32 learning stations was installed along with the courseware for Primary Reading. The Learning Center was used by 101 Grade 3 students for 30 minute sessions, three to four times a week. The WICAT predictive state assessment test was administered as described above for Pharr-San Juan-Alamo district. The Texas Educational Assessment of Minimum Skills was administered to all students grades 3 during February 1986 and February 1987. The February 1986 results are prior to implementing the Learning Solution. Table 3 presents the learning outcome results. These results show significantly greater achievement growth for the school (13 to 28% gains) than the comparable state results (5 to 13%).

TABLE 3
EDUCATIONAL OUTCOME RESULTS
PERFORMANCE ON THE TEXAS STATE ASSESSMENT TEST
SAN JACINTO ELEMENTARY SCHOOL, TX
SPRING 1986 - SPRING 1987

SUBJECT	GRADE	SCHOOL RESULTS	STATE RESULTS
READING	3	61% passing (1986)	74% passing (1986)
		89% passing (1987)	79% passing (1987)
		28% Gain	5%
MATH	3	83% passing (1986)	80% passing (1986)
		96% passing (1987)	86% passing (1987)
		13% Gain	6% Gain
WRITING	3	51% passing (1986)	50% passing (1986)
		76% passing (1987)	63% passing (1987)
		25% Gain	13% Gain

Blackstock Junior High, Oxnard, CA

The Learning Solution was installed in the Blackstock Junior High School during the 1984-1985 school year. Blackstock School is a 6-8 grade junior high school with a total enrollment of 810 students. Sixty percent are minority students with the largest group being 44% Hispanic. The Learning Center with 30 learning stations was installed along with the courseware for Reading Comprehension and Mathematics. Students used the Learning Center for 15 minute periods 5 times a week for reading, and 5 times a week for mathematics. An evaluation was conducted for 112 6th grade students using the Comprehensive Test of Basic Skills administered during the spring of 1983, 1984 and 1985. School percentile scores and gains were compared for Spring 1983 and Spring 1985. The Spring 1983 scores were prior to implementing the Learning Solution. Table 4 presents the learning outcome results. These results show learning gains of 11 to 30% over the two year period.

TABLE 4
EDUCATIONAL OUTCOME RESULTS
BLACKSTOCK SCHOOL, OXNARD, CA
COMPREHENSIVE TEST OF BASIC SKILLS
SPRING 1983 - SPRING 1985

SUBJECT	GRADE	NATIONAL PERCENTILE
READING	6	48 (1983) 61 (1985) 13 Percentile Gain
MATHEMATICS	6	47 (1983) 77 (1985) 30 Percentile Gain
LANGUAGE ARTS	6	49 (1983) 60 (1985) 11 Percentile Gain

Zenos Coleman Elementary School, Chicago, IL

The WICAT Learning Solution was installed at the Zenos Coleman School, Chicago, IL during the 1985-1986 school year. Coleman school is a K-8 grade school with an enrollment of 950 students. Nearly all of the students (98.5%) live in public housing projects. The entire student population is black. The school implemented a 32 station Learning Center including the K-8 Mathematic and K-3 Primary Reading courseware. A total of 233 students from grades 1-6 used the Learning Center for 90 minutes a week in reading and 60 minutes a week in mathematics. The Iowa Test of Basic Skills was administered to Grade 1 students in November, 1985 and April, 1986, and to Grade 2-6 students in April, 1985 and April, 1986. Table 5 presents the learning outcome results. These results show grade equivalent gains twice as large with the learning solution compared with prior achievement gains with standard classroom instruction.

TABLE 5
EDUCATIONAL OUTCOME RESULTS
ZENOS COLMAN SCHOOL, CHICAGO, IL.

		Grade 1 N=71	Grade 2-6 N=162
MATHEMATICS	LS	7.7 months gain in five months	9.8 months gain in nine months
	CI	3.9 months gain prior year	4.4 months gain prior years
READING	LS	9.1 months gain in five months	9.5 months gain in nine months
	CI	6.9 months gain prior years	4.5 months gain prior years

KEY

LS = Learning Solution
CI = Classroom Instruction

McCorkle Elementary School, Chicago, IL.

The WICAT Learning Solution was installed in the McCorkle Elementary School, Chicago, IL. during the 1986-1987 school year. McCorkle Elementary School, located on Chicago's southside, is a preschool-8th grade elementary school with an average enrollment of 600 students. Approximately 90% of the students live in public housing projects. The student population is black. A WICAT Learning Center with 32 learning stations was installed along with the courseware for Primary Reading, Reading Comprehension, and Mathematics. The students used the Learning Center for five 35 minute periods, three times a week in reading, and two times a week in mathematics. The Iowa Test of Basic Skills was administered to 400 students in grades 4-8 during April, 1986 and April, 1987. Table 6 summarizes the learning outcome results. These results show grade equivalent gains which are significantly greater with the learning solution than with prior achievement gains with standard classroom instruction.

TABLE 6
EDUCATIONAL OUTCOME RESULTS
MCCORKLE ELEMENTARY SCHOOL, CHICAGO, IL.

		Grade 4-8 N=400
MATHEMATICS	LS	8.1 months gain in five months
	CI	5.7 months gain prior years
READING	LS	10.6 months gain in five months
	CI	4.2 months gain prior years

KEY

LS = Learning Solution
CI = Classroom Instruction

DISCUSSION

This paper has presented a comprehensive description of the WICAT Learning Solution and promising achievement results for minority students. These achievement results were demonstrated on state assessment tests and standardized norm-referenced achievement tests. Similar significant learning gains were found across districts, regional locations and minority populations. Following are some possible explanations for these significant learning results.

First, the Learning Solution includes computerized, criterion-referenced tests to assessing and targeting specific individual learning needs. These computerized tests provide prescriptions and placement into the courseware as well as classroom textbooks to help students master the instructional objectives. These computerized tests can be administered as often as required to provide assessments of student progress on specific instructional objectives.

Second, the comprehensive courseware presented in the Learning Center is an effective educational supplement to the traditional classroom instruction. The courseware has sufficient scope and breadth to meet the needs of students at every grade K-12 in mathematics, reading, and language arts areas. These individual learning needs can be met for mainstream students, remedial students and gifted and talented students. The courseware also teaches higher order thinking and problem solving skills along with the basic skills instruction. The courseware provides truly individualized instruction with unlimited example and practice trials using a combination of text, graphics, high quality audio and animations. Minority students can benefit significantly from the quality courseware design, step by step presentation, interactive example and practice opportunities, and the graphics and audio instructional supplements.

Third, the Learning Solution provides teachers with a comprehensive instructional management system for individual student and class progress tracking. These management reports indicate student progress on test objectives and courseware instruction. Teachers can readily modify the student courseware assignment lists to better meet individual student needs. As teachers continue to integrate the Learning Center instruction with their classroom instruction the student's learning achievement will

improve significantly. With previous individualized instructional systems the teachers were often overwhelmed with the amount of paperwork and management time required to provide individual assignments, lessons and tests for each student. With the computerized courseware the teacher can easily do the management work required for individualized instruction. Teachers also provide instructional support and individual help to students in the Learning Center.

Fourth, the minority students themselves report significant value from using the Learning Solution. The students report liking the individualized, one-on-one instruction which the courseware provides, the interactive practice and feedback exercises, and the high quality of the text, graphics and audio instruction. Students like to keep track of their own progress through the courseware lessons and testing activities. As shown above the Learning Solution also produces significantly student achievement and learning gains for minority students on state assessment tests and standardized achievement tests.

This paper has described and demonstrated the benefits from the Learning Solution for minority students. These results offer the promise of significant improvement of minority student achievement with implementation of the Learning Solution.

REFERENCES

Olsen, J. B. (1987). Guidelines for Evaluating the WICAT Learning Solution. Orem UT: WICAT Systems.